INSTRUCTION MANUAL

ELECTRO-SCAN PROGRAMMER

MODEL ESC-125C

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ELECTRO-METRICS
A PENRIL COMPANY

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INSTRUCTION MANUAL

ELECTRO-SCAN PROGRAMMER

Model ESC-125C

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Section I

Introduction and Specifications

1.1 The Manual

This manual contains all relevant information for the operation, maintenance, and repair of the ESC-125C Electro-Scan Programmer.

1.2 The ESC-125C Programmer

The ESC-125C Programmer is a specialized command and mode function control unit. It controls the Electro-Metrics Model EMC-10 and Model EMC-25 Interference Analyzers and presents the information produced by the analyzers in a wide range of X-Y plot formats using an X-Y recorder or as CRT presentations using a conventional oscilloscope.

The major function of the ESC-125C is to control the Model EMC-25 Interference Analyzer which utilizes fifteen remotely switchable octave bands to cover the frequency range 10 kHz to 1 GHz. The Model EMC-10 Interference Analyzer is used to extend the frequency range down to 20 Hz.

An optional X-Y recorder allows the ESC-125C to make hard copies of multi-band plots on a single sheet of chart paper utilizing a number of different formats (1x1, 16x1, 8x2, 4x4). The ESC-125C also has the capability to provide spectrum analyzer displays of each of the fifteen RF bands of the Model EMC-25 Interference Analyzer (range 10 kHz to 1000 MHz) utilizing any conventional oscilloscope.

A sweep slow down circuit incorporated in the ESC-125C

provides the programmer with the ability to control the Model EMC-25 analyzer in the auto scan mode. This allows accelerated scanning when using average detection, but slowing the scan down for accurate plotting of narrow band RF signals.

1.3 Unpacking

1.3.1 Remove the instrument carefully from the shipping carton and examine thoroughly for shipping damage. If there is any damage, replace the instrument in the shipping carton and immediately inform the manufacturer and the shipping company of the nature of the damage, the serial number of the instrument, the delivery date, and the invoice number.

1.3.2 Check contents of the carton against the shipping slip to be sure that all components and accessory items ordered are present. Notify the manufacturer immediately of any missing items.

1.4 Electronic Shipping Damage

Before leaving the factory, this instrument was subjected to a complete operational check. However, it is possible that electronic damage may have occurred in transit. It is desirable, therefore, to check the operation of the instrument as soon as possible after unpacking.

To do so, perform the calibration tests outline in Paragraph 3.5.1 . If the instrument does not perform as per these instructions, inform the Electro-Metrics Customer Service Department (518)843-2600, giving the information required in Paragraph 1.3.1.

1.5 Installations

1.5.1 The ESC-125C is designed for either bench top operation or for installation in a conventional 19 inch equipment rack.

1.5.2 Rack mounting requires the use of two adapter mounting brackets( ). Using these two brackets, install the instrument by the following procedure:

a) Using 3/8 inch number 8-32 screws, fasten the brackets to the sides of the instrument at the matching screw hole.

1.6 Electrical Specification

1.6.1 Power Requirements

The ESC-125C operates on 115 or 230VAC, 47-63 Hz A.C. power.

1.7 Mechanical Construction

The ESC-125C utilizes the open frame method of construction. Self-aligning bars screwed together plus several lateral bars across the top and bottom from the main frame of the unit. All the internal components (power supplies, printed circuit cards, etc...) are attached to the lateral and main bars by the use of standoffs and screws. The external panels and covers are likewise attached to the outside of the bars using screws.

Section II

Theory of Operation

2.1 General

2.1.1 The ESC-125C Programmer is divided by function and operation into three sections; classified as Logic, Sweep, and Presentation. The following discussion is divided along these same general lines. A synopsis of each section is given below.

2.1.1.1 Logic - This section sets up the programmer routines, provides the proper information to the analyzers for performing the routines, and establishes the conditions under which the routines are performed.

2.1.1.2 Sweep - This section provides the sweep voltages for use during the scan routines, established the X and Y output voltages for use by the presentation section and the external oscilloscope.

2.1.1.3 Presentation - This section provides the X-Y recorder with the necessary scaling information for the different plotter formats, provides the command logic for the pen drop and pick up functions, and provides the various external accessories (for example the SU-125) with the necessary information for proper operation.

2.1.2 The schematics located in Section VII and the following block diagrams will be useful in understanding the ESC-125C Programmer operation.

Figure 2-1 ESC-125C Programmer Block Diagram

Figure 2-2 Logic Board A2A2 Block Diagram

Figure 2-3 Sweep Board A2A3 Block Diagram

Figure 2-4 Display Board A2A4 Block Diagram

2.2 LOGIC SECTION

The majority of the circuitry for this section is located on the Logic board A2A2 (see Figure 2-2 and 7-3). This section is divided into three subdivisions; the STATE SELECT, the BAND COMPARATOR, and CONTROL MODE - PLOTTER CAL circuits.

2.2.1 STATE SELECT CIRCUIT.

The state select circuit determines the frequency band to be scanned by the programmer. A series of 16 toggle switches on the front panel in conjunction with a decoder and counter in the state select circuit form the band/state selecting network. The counter in conjunction with a clock circuit counts through four output states which correspond to the four band codes utilized by the EMC-25 analyzer. These band code lines fan out to two seperate points in the logic circuit.

One set goes to the band comparator circuit, which will be covered in detail later, and the other set goes to the decoder. The decoder produces; depending on the band code input, a low or not ($\overline{S}$) state on one of 16 output which correspond to Band 0 through Band 15 of the analyzers. For example, if a band code 1 and a band code 8 are outputted into the decoder by the counter; the decoder will produce a low state for the output corresponding to band 9. The remaining 15 outputs will be high. Each of the 16 outputs of the decoder goes to a corresponding LED light and one side of a toggle switch located on the front panel. The common of each switch is connected to the cathode of a diode. The anode ends of the 16 diodes are connected together and returned to the clock circuit.

This forms one part of the frequency selection system. With the toggle switch open (DOWN position) a low output from the decoder will momentarily activate the LED light. The open switch allows the return line to the state select circuit to remain at a logic high permiting the clock and counter to advance to the next higher band state. With the toggle switch closed (UP position) a low output from the decoder will activate the LED light and also force the return line to the state select circuit low. This stops the clock and halts the counter forcing the decoder to remain in the band state dictated by the switch selected. (For example, if the band switch for band 9 is closed, when the decoder output reaches band 9 the LED light is activated and the circuit operation halted at that point). It will remain in the band state selected until the clock receives a command to resume operation. This command can come from either the manual STEP switch operation or the end of band stop command from the sweep circuit.

The Multi-Scan Enable Flip-Flop and Scan Mode Switch, which is part of the clock-counter circuit, determines whether the clock-counter goes through its complete counting sequence once (single scan) or continuously repeats the sequence (multi-scan). The Scan Mode switch is a toggle switch which is used to open or close a connection to the RESET portion of the MODE CONTROL circuit. The Multi-Scan Enable Flip-Flop produces a logic low pulse whenever the counter reaches the band state codes equivalent to band 15. When the Scan Mode switch is open (multi-scan), the logic low pulse through a driver resets the counter back to its initial state which is equivalent to band 0. Since the clock circuit is

still running, the counter will again start through its normal counting sequence. When the switch is closed (single-scan), the logic low pulse again rests the counter but also halts the clock by activating the RESET mode of the programmer.

2.2.2 BAND COMPARATOR CIRCUIT.

The band comparator circuit is utilized by the programmer to command the EMC-25 to advance to the band selected by the state select circuit. The comparator utilizes two sets of band code input lines; one set is received from the state select circuit counter, while the second set is received from the EMC-25 analyzer via a rear panel connector (J1). The comparator compares the logic readings on each set of band code lines and using this information will command the EMC-25 in the following manner:

a) If the band codes are not equal, it will command the EMC-25 to step until the band codes are equal.

b) If the band codes are equal, no step commands are given.

The comparator stepping circuit includes a section which determines if the step command given to the EMC-25 will advance the analyzer in a forward or reverse direction. If the difference between the two band code readings are less than 8, the analyzer will be commanded to step in a forward direction. If the difference between the two band code readings are 8 or more, the analyzer will be commanded to step in a reverse direction.

The manual STEP switch on the front panel does not connect to the actual step circuitry of the band comparator circuit. It is instead connected to the clock-counter circuit of the state select

circuit. The STEP switch is a push button type with the common contact connected to ground and the NO contact connected to the clock-counter circuit STEP flip-flop. When depressed, a logic low is sent to the STEP flip-flop, which in turn pulses the counter to advance to the next higher band code state. Unless the STEP switch is depressed again the counter will return to its normal counting sequence.

2.2.3 MODE CONTROL AND PLOTTER CAL CIRCUITS

A third subdivision of the logic section contains the Mode Control and Plotter CAL circuits. The mode control circuit establishes the majority of the conditions under which the sweep, state select, and band comparator circuits operate.

The front panel START, STOP, and RESET switches are an integral part of the mode control circuit. These switches are a push button type with the common contacts connected to ground and the NO contacts connected to points within the mode control circuit. A logic low from any one of the three switches will initiate a change of state on the two flip-flop, designated STOP-START and RESET, which comprise the main part of the mode control circuit.

When the RESET switch is depressed it initiates several simultaneous events. It activates the Plotter CAL circuit which permits the X-Y recorder operated with the ESC-125C Programmer to be calibrated. The upper right ( ) and lower left ( ) switches are part of the Plotter CAL circuit and again are push button types with the common contacts going to ground and NO contacts connected to the Plotter CAL circuit. These two switches change the state of the Plotter CAL flip-flop whose outputs (via several drivers)

activates the presentation circuit for control of the plotter pens during plotter calibration. The RESET switch also resets the counter to its initial state (equal to band 0), activates the STOP circuit and STOP light, activates the RESET and upper right (↑→) lights, and halts the clock in the clock-counter circuit.

The START switch when depressed starts the clock circuit and activates the START light.

The STOP switch when depressed stops the clock circuit and activates the STOP light.

2.3 Sweep Section

The majority of the circuitry for this section is located on the sweep board A2A3 (see figure 2-3 and 7-4). The sweep section is divided into four subdivisions; the SWEEP, MANUAL TUNE, Y AMPLIFIER, and OSCILLOSCOPE DISPLAY circuits.

2.3.1 SWEEP CIRCUIT

The sweep circuit comprises the following subcircuits; Sweep Voltage Control circuit, Sweep Generator circuit, Sweep Delay circuit, Auto-Sweep circuit, and Pen and Retrace Command circuit.

2.3.1.1 SWEEP VOLTAGE CONTROL CIRCUIT

The Sweep Voltage Control circuit initiates the sweep routine for the ESC-125C Programmer. A logic high from the Logic section START circuit activates this circuit which in turn produces a fixed D.C. output voltage (nominal voltage +13.0V D.C.) that is routed through the front panel Sweep Multiplier Control to the Sweep Generator circuit. The Sweep Multiplier Control in conjunction with

the sweep time switch sets the sweep rate for the programmer.

The Sweep Multiplier Control is a variable multi-turn pot with the Sweep Voltage Control circuit output connected to one end. The other end goes through a fixed resistor to ground while the wiper returns to the sweep board and the input to the sweep generator circuit. Thus, it controls the amount of D.C. voltage applied to the Sweep Generator circuit and the higher the applied voltage the faster the sweep rate.

The Sweep Voltage Control circuits has two additional inputs which affect the sweep rate; one is the input from the Auto-Sweep circuit while the other is from the NO contact of the front panel STOP switch.

The major function of the STOP switch and its physical arrangement has already been explained in the discussion on the Logic section. When utilized in its normal mode of operation the sweep operation is stopped because of the logic low now applied to the Sweep Voltage Control circuit input. However, when the STOP switch is physically held depressed, the logic low output from the switch is constantly applied to a transistor switch located in the Sweep Voltage Control circuit. This initiates a sequence of events which generates a negative output voltage for the Sweep Voltage Control circuit. When applied to the Sweep Generator circuit it produces a reverse sweep voltage. As long as the STOP switch is held physically depressed it permits the programmer to back sweep a band block.

2.3.1.1.1 AUTO-SWEEP CIRCUIT

The Auto-Sweep circuit utilizes the AM and FM Video inputs

from the EMC-25 analyzer for selectively slowing the sweep rate during a sweep routine. When activated by a logic low from the front panel AUTO-SWEEP toggle switch, it permits the ESC-125C to scan at a high sweep rate until a signal is encountered by the EMC-25 Analyzer.

NOTE: The Auto-Sweep feature only functions when utilized with a Model EMC-25 Interference Analyzer.

This causes an increase in the video outputs of the EMC-25, which is detected by either the AM or FM video detectors in the Auto-Sweep circuit. The FM video is utilized for the lower frequency bands, while the AM video is utilized for the higher frequency bands. The resultant positive voltage output is applied to the Sweep Voltage Control circuit at a point which decreases the amount of positive output voltage in direct proportion to the signal level input to the EMC-25. This, as previously explained, decreases the sweep rate of the Sweep Generator circuit. As the signal input level decreases, the sweep rate increases until the normal sweep rate is attained.

NOTE: The Auto-Scan circuit is utilized when a fast sweep rate is desired but with accurate plotting of all average detected signals.

2.3.1.2 SWEEP GENERATOR CIRCUIT

The Sweep Generator circuit produces the linear sweep voltage (X axis) utilized by the X-Y recorder and the external oscilloscope. The circuit produces a ramp voltage whose rise time is determined by the front panel Sweep Multiplier Control and Sweep Time switch.

The Sweep Time switch is a four pole rotary switch whose wiper contact is connected to ground. Each of the four switch

positions connects to a FET switch located on the sweep board. Each FET switch is used to switch a fixed value of capacitance into the Sweep Generator circuit. These four values of capacitance set the basic sweep rates of 0.1, 1.0, 10 and 100 seconds per band block. These sweep rates are modified by varying the fixed D.C. voltage output from the Sweep Voltage Control circuit by use of the Sweep Multiplier Control. In the X1 position of the Sweep Multiplier Control the full voltage value is applied to the Sweep Generator input, decreasing as the control is moved towards the X10 position. As noted before; as the sweep control voltage is decreased, the charge rate on the capacitor decreases and thus the sweep time increases. Also changes in the Sweep Voltage Control output produced by the Auto-Sweep circuit and use of the STOP switch will introduce variations into the basic sweep rates. The sweep voltage output of the Sweep Generator circuit is applied to the Pen and Retrace Command circuit and to the front panel MODE CONTROL switch.

The MODE CONTROL switch is a three pole, two section rotary switch with the wiper for each section returning to the sweep board. On the sweep board block diagram Figure 2-3 the two sections are designated A and B, with the three switch positions designated SECTOR, SPECTRUM and MANUAL. The Sweep Generator circuit output is connected to the SPECTRUM position on section A and to both the SPECTRUM and SECTOR positions on section B. The section A wiper connects to the EMC-25 and EMC-10 Tune Amplifiers on the sweep board, while the section B wiper connects to the Oscilloscope X Amplifier on the sweep board. Also a second output from

the section B connects to the X Input Amplifier on the Display board A2A4. The EMC-25 and EMC-10 Tune Amplifiers' outputs connect via rear panel connectors to the remote tuning voltage inputs of the respective analyzers. The Oscilloscope X Amplifier output connects via a rear panel BNC connector to the horizontal input of an external oscilloscope.

2.3.1.3 PEN and RETRACE COMMAND CIRCUIT

The Pen and Retrace Command circuit controls the operation of the X-Y recorder pen drop and provides the commands for initiation of the sweep voltage and for the end of band sweep voltage termination. The circuit comprises a series of IC comparators designated Retrace Start, Pen UP Command, Pen DOWN Command, Retrace Stop, Retrace Gate, and Pen Drop Control.

The following discussion of circuit function and operation commences at a point in time with the sweep operating, the X-Y recorder pens down and progressing across a selected band block, and the scan routine is multi-band and multi-scan. The range of the sweep voltage has its upper limit (the upper end of the band block) set by the Retrace Level Adjustment. This adjustment, located on the sweep board A2A3, sets the voltage levels for the non-inventing inputs to the Retrace Start and Pen UP Command comparators. As the sweep voltage approach the limit set by the Retrace Level adjustment, the increasing positive voltage triggers the Pen UP Command comparator. The comparator output goes negative which forces the Pen Drop Control comparator output negative. The negative output from the Pen Drop Control comparator turns a transistor switch (located on the display board A2A4) off, allowing a

logic high command to lift the plotter pens. The Pen UP Command is activated before the Retrace Start to allow the plotter pens time to lift completely before the end of sweep sequence is initiated. When the sweep voltage reaches the limit level, the Retract Start comparator is triggered. The comparator output goes negative which forces the output of the Retrace Gate comparator negative. The output of the Retrace Gate is connected to three circuit points. One line goes to the Logic board (A2A2) and initiates the sequence needed for band step. The second line returns to the Sweep Generator circuit to discharge the capacitor used to set the sweep time and to force the input to the Sweep Generator negative. The third line goes to the Sweep Delay circuit. The negative input to the Sweep Generator produces a negative output. This negative output triggers the Retrace Stop comparator to produce a positive output. The positive output is applied to the Retrace Gate which forces the output of the comparator positive. The Pen DOWN Command comparator is forced negative by the Sweep Generator output which maintaines the input to the Pen Drop Control comparator at a negative level keeping the output negative and thus the plotter pens UP. When the Sweep Generator output goes positive with the start of the sweep voltage, the Pen DOWN Command comparator output goes positive. This allows the Pen Drop Control comparator output to become positive which turns on a transistor switch. This produces a logic low on the plotter pen control lines forcing the pens to drop.

2.3.1.4 SWEEP DELAY CIRCUIT

The Sweep Delay circuit inhibits the start of the sweep voltage

and thus the plotter pen drops until the pens are properly positioned in the correct band block. The delay circuit incorporates two mono-stable multivibrators circuits whose pulse widths are determined by an external timing circuit for each multivibrator. The pulse widths and triggering sources are different for each multivibrator circuit. The shorter pulse width circuit is triggered by the negative output from the Retrace Gate comparator, while the wider pulse width circuit is triggered by a logic high on the Sweep Reset line from the Logic board A2A2. The $\overline{Q}$ output of each multivibrator circuit is connected via a diode to the Sweep/Hold command line to the Sweep Voltage Control circuit.

The delay circuit operates in the following manner: If the ESC-125C is stepping from one band to the next higher number band (for example from band 6 to band 7), the Retrace Gate negative output trailing edge triggers the short pulse width multivibrator circuit. This produces a negative pulse on the $\overline{Q}$ output which pulls the Sweep/Hold command low and maintains this condition for the duration of the pulse. This inhibits the Sweep circuit from operating until the pulse ends which returns the Sweep/Hold line to its normal operating state. If the ESC-125C step between bands becomes greater than two, the plotter format (4x4, 8x2) dictates the need to change between band block levels, or the sweep routine is being initially activated the wider pulse width circuit is triggered. The Sweep Reset output becomes and remains a logic high until

the band code from the EMC-25 and the ESC-125C counter band code match. The logic high turns on a transistor switch which pulls the trigger input to the circuit to a logic low. The Sweep/Hold command line is connected via a diode to the trigger line and thus is also pulled low. When the Sweep Reset finally goes low, it turns off the transistor switch which allows the trigger line to go high. This transition from low to high triggers the multivibrator circuit and produces a negative pulse on the $\overline{Q}$ output which keeps the Sweep/Hold command line low for the duration of the pulse. These actions keep the sweep inhibited while the band matching is occurring between the ESC-125C and EMC-25. When the band codes match the triggering of the multivibrator circuit allows sufficient time for the plotter pens to attain the correct positioning in the proper band block. When the pulse ends the sweep sequence commences as explained in Section 2.3.1.1 through 2.3.1.2.

2.3.2 MANUAL TUNE CIRCUIT

The Manual Tune circuit buffers the tuning voltage inputs from the EMC-25 and EMC-10 Analyzers for use by the Tune Gain Amplifiers.

The tuning voltages from the EMC-25 and EMC-10 tune pots are received via rear panel connectors from the respective analyzers. The circuit uses a relay to switch between the two inputs, with the EMC-25 input connected to the NC contact and the EMC-10 input connected to the NO contact. A logic high on a command line from the Signal Select board A2A6 activates

the relay for EMC-10 position. The relay common connects to the input to the Manual Tune Buffer. The output of the Buffer feeds the input to the Manual Tune Amplifier. The Manual Tune Amplifier output connects to the MANUAL position of the front panel MODE switch A and B sections. The A section wiper goes to the EMC-25 and EMC-10 Tune Gain Amplifiers, while the B section wiper goes to the X Amplifier for the external oscilloscope. In the MANUAL position of the MODE switch, the entire circuit is set for unity gain thus the output follows the input.

2.3.3 Y AMPLIFIER CIRCUIT

The Y Amplifier circuit amplifies and buffers the Y (vertical) outputs from the EMC-25 and EMC-10 Analyzers for use by the ESC-125C Presentation circuit and for use by the external oscilloscope.

The EMC-25 Y input, received via a rear panel connector, is applied to the input of the EMC-25 Y Gain Amplifier and Marker Buffer. The output of the EMC-25 Y Gain Amplifier and Marker Buffer is connected to the NC contact of a relay, while the EMC-10 Y input (again received via a rear panel connector) is connected to the NO contact.

NOTE: The relay utilized here and by the Manual Tune circuit is a double pole, double throw relay. The Manual Tune circuit use one pole, while the Y Amplifier circuit uses the other pole.

The common of the relay is connected to the input of the Switched Y Buffer. The output is utilized by the Presentation circuit (Display board A2A4) and for the vertical input to the external oscilloscope. In the EMC-10 position, the Switched Y Buffer also

function as the EMC-10 Y Gain Amplifier.

2.3.4 OSCILLOSCOPE DISPLAY CIRCUIT

The Oscilloscope Display provides the information required by the external oscilloscope to present a spectrum display of a scan routine.

The Y (vertical)output to the oscilloscope is obtained from the output of the Switched Y Buffer. The X (horizontal) output to the oscilloscope is obtained from the Oscilloscope X Amplifier circuit. The blanking (Z) output to the oscilloscope is obtained from the Pen Drop Control circuit. The sweep rate for the oscilloscope is set by the ESC-125C front panel SWEEP TIME switch which determine (along with the SWEEP MULTIPLIER control) the Sweep Generator circuit sweep rate (see section 2.3.1.2). The 0.1 and 1.0 second positions of the SWEEP TIME switch are designed sepcifically for use in setting the sweep rates for the oscilloscope. Diode logic is used to inhibit the operation of the X-Y recorder while they are being utilized.

The Marker circuit generates a repetitive fixed width pulse which is applied, via a front panel toggle switch (MARKER ON-OFF) to the EMC-25 Y Gain Amplifier and Marker Buffer input. The oscilloscope operation utilizes the Marker function in two ways; for use as a frequency indicator operating in conjunction with the EMC-25 tuning control in SPECTRUM and as a fixed reference in SECTOR. In SPECTRUM mode the MARKER moves across the spectrum display following the direction of the EMC-25 tuning dial. This is accomplished

by applying the tuning voltage output from the Manual Tune Amplifier to the Marker circuit. In the Marker circuit it produces a secondary X (horizontal) output on which the Marker (Y or vertical) output is riding. This combined X and Y output appears on the oscilloscope display superimposed over the regular spectrum display.

The Sector Display circuit is utilized (in conjunction with the front panel DISPERSION control) to expand a section of the spectrum display. The circuit produces a modified sweep voltage which is applied, in the SECTOR position of the MODE switch, to the tune voltage circuit of the analyzer. The circuit compares the manual tuning voltage input from the analyzer and the Sweep Generator sweep voltage output to produce the modified sweep voltage output. With the DISPERSION control at minimum, the sweep voltage applied to the tuning circuit of the analyzer covers the full tuning range of the unit. This allows a full spectrum display to be produced on the oscilloscope. With the DISPERSION control at maximum, the sweep voltage applied to the tuning circuit of the analyzer is reduced to a proportion of the actual full range tune voltage. Thus only a selected portion of the selected band is scanned. However, since the Sweep Generator and associated circuits still function in a normal manner, the oscilloscope still receives the normal horizontal input for full display sweep. This expands the selected spectrum display across the entire CRT of the oscilloscope. The manual tuning voltage input sets the fixed point around which the

sweep width is adjusted. Since the manual tuning voltage produces the MARKER signal, in the SECTOR MODE the MARKER signal will also be fixed in the center of the CRT display.

2.4 PRESENTATION SECTION

The circuitry for this section is located on the Display board A2A4, Plotter Offset board A2A5, and the Signal Select board A2A6 (see Figure 2-1, 2-4, 7-5, 7-6, 7-7). The Presentation circuit is divided into five subsections; X Output circuit, Y Output circuit, Scaling Control circuits, Secondary Input circuits, and Accessories Control circuit.

2.4.1 X OUTPUT CIRCUIT

The X Output circuit supplies the voltage needed to drive the X-Y recorder along its X or horizontal axis. In addition the circuit generates the gain and offset voltages required for the different formats (4x4, 8x2, 16x1) utilized by the ESC-125C.

The X output from the sweep board (A2A3) is applied via the B section of the front panel MODE switch to the X input of the Display board (A2A4). The X input voltage is applied to the input of the X Gain Amplifier which functions as a buffer amplifier between the input and internal circuitry. A variable resistor in the X Gain Amplifier feedback circuit sets the output gain of the X Output circuit. The output of the X Gain Amplifier is applied to the X Scaling circuit which generate the different X Gain and X Offset current factors for each of the plotter formats (1x1, 4x4, 8x2, 16x1) utilized by the ESC-125C. The circuit utilizes two D-A converters; one

for the X Gain, the other for the X Offset, to produce the current factors needed. Each D-A converter receives various logic inputs (designated Scaling Control Bits) from the Scaling Control circuit which sets the output current levels for each converter. Depending upon the logic levels of the Scaling Control Bits the converter sets the output current level as a proportion of the input level. The X Gain converter receives its input from the X Gain Amplifier and sets the trailing edge of each band block. The X Offset converter receives its input from the X Offset Amplifier and sets the leading edge of each band block. The X Gain converter and X Offset converter outputs are tied together and connected to one side of a FET switch. The other side of the switch connects to the input of the X Output Amplifier, whose output feeds the X input of the X-Y recorder. The proportioned current output of the converters applied to the X Output Amplifier input produces a similarly proportioned voltage output. By this means the X-Y recorder's X voltage plotting range of 0 to 1.5V D.C. is subdivided into 1, 4, or 16 subdivision blocks depending upon the plotter format choosen. Thus while the sweep voltage input to the X Output circuit will remain the same range for all bands, the voltage output will be a ratio of 1 to 1, 4 to 1, or 16 to 1. The input to the X Output Amplifier is connected to three FET switches. Each of the FET switches is connected to a logic command line from the Logic board (A2A2) which activates the switch with a logic low. The lines are designated Normal, Lower Left( ),

and Upper Right (↑) and only one line is activated low at one time. The one switch, as explained above, switches the converter outputs and is activated by a low on the Normal command line. The second switch goes to ground via a fixed resistor and is activated by the Lower Left command line. The third switch goes to a variable resistor designated X CAL and is activated by the Upper Right command line. The Normal line is activated for the normal operation of the ESC-125C, while the Lower Left and Upper Right lines are activated when the ESC-125C is being used to calibrate the X-Y recorder.

2.4.2 OUTPUT CIRCUIT

The Y output circuit supplies the voltage needed to drive the X-Y recorder along its Y or vertical axis. The Y output circuit is divided into a Y_1 Output circuit and a Y_2 Output circuit and as in the X Output circuit, each generates the Gain and Offset voltages required for the different formats utilized by the ESC-125C.

The Y output from the Sweep board (A2A3) is applied to the Y_1 input to the Display board (A2A4). The Y input voltage is next applied to the input of the Y_1 Buffer Amplifier whose output in turn is fed to two FET switches. The output of one FET switch feeds the Y_1 Scaling circuit, while the output of the other FET switch feedstthe Y_2 Scaling circuit. The Y_1 and Y_2 Scaling circuits are identical in layout, function, and operation to the X Scaling circuit described in section 2.4.1. The output circuitry for the Y_1 and Y_2 outputs are again identical

in layout, function and operation to the X output circuit. The Y_1 Output Amplifier feeds the Y_1 input to the X-Y recorder which controls the operation of Pen #1, while the Y_2 Output Amplifier feeds the Y_2 input of the X-Y recorder and controls the operation of Pen #2. Differences between the operation, function and layout of the Y circuits and the X circuit is explained below.

The Y_1 and Y_2 Gain D-A converters received part of their scaling control bits from the front panel PLOTTER FORMAT switch. The vertical output voltages for Y_1 and Y_2 are subdivided into proportions of 1 to 1, 2 to 1, or 4 to 1 to cover the plotter formats utilized by the ESC-125C. The Y_1 and Y_2 Gain controls set the top edge of the band block, while the Y_1 and Y_2 Offset controls set the bottom edge of the band block. The Y_1 and Y_2 circuits contain an additional set of FET switches whose purpose is to change the input sources to the Y_1 and Y_2 Scaling circuits. These particular FET switches are controlled by three logic command lines from the front panel Pen #2 CONTROL switch, These lines are designated OFF, AVERAGE, and AUXILIARY and activate the FET switches by going to a logic low.

When the OFF line is activated, the Y_1 and Y_2 Scaling circuits both receive the Y input from the Sweep board A2A3. The Y_1 and Y_2 outputs for this condition are identical and equal to each other.

When the AVERAGE line is activated, the Y_2 Scaling circuit receives its input from the EMC-25 Average circuit, while the

Y Scaling circuit input remains the same as above.

When the AUXILIARY line is activated, the Y and Y Scaling circuits receive their inputs from the Auxiliary #1 and Auxiliary #2 circuits respectively.

2.4.3 SCALING CONTROL CIRCUIT

The Scaling Control circuit produces the Scaling Control Bits for use by the Scaling circuits in generating the proper gain and offset voltages to compensate the X-Y recorder for the different plotter formats utilized by the ESC-125C. The circuitry for the Scaling Control circuit is located on the Plotter Offset board A2A5.

The circuit consists of a series of "NAND" gates and drivers whose final outputs go to the Display board (A2A4) and the X, Y_1 and Y_2 Scaling circuits. The circuit input comprises the buffered band code logic from the Logic board (A2A2) and the logic command inputs from the front panel PLOTTER FORMAT switch. The final X and Y Gain and Offset Scaling Control Bits are produced by a combination of band code logic and the position of the PLOTTER FORMAT switch. Thus for each plotter format (1x1, 4x4, 8x2, 16x1) and each analyzer band, an unique set of Scaling Control Bits is produced for that particular combination.

2.4.4 SECONDARY INPUT CIRCUITS

The Secondary Input circuits comprise the EMC-25 Average, Auxiliary #1, and Auxiliary #2 circuits. The three circuits are similar in layout, function, and operation and are activated by the Pen #2 CONTROL switch AVERAGE and AUXILIARY

positions. Each circuit contains two variable resistors which are utilized in matching the gain and offset for each circuit to the main Y input from the Sweep board A2A3. These circuits are located on the Display board.

2.4.4.1 EMC-25 AVERAGE CIRCUIT.

This circuit is activated in the AVERAGE position of the Pen #2 CONTROL switch. It utilizes the EMC-25 AM video input to produce an averaged response of the EMC-25 RF signal input. It is generally used when the EMC-25 Analyzer is set for PEAK detection and the user's requirement dictates the need to simultaneously plot both the PEAK and AVERAGE responses to an RF input signal.

2.4.4.2 AUXILIARY #1 and AUXILIARY #2 CIRCUITS.

These circuits are activated in the AUXILIARY position of Pen #2 CONTROL switch. The circuits are supplied via the rear panel AUXILIARY connector with external Y inputs up to a maximum of 2.0V D.C. The AUXILIARY connector and circuits are generally used when an external CRM-25 is being utilized with an EMC-25 Analyzer to obtain CISPR-type measurements.

The Secondary Inputs are utilized only with the EMC-25 Analyzer.

2.4.5 ACCESSORIES CONTROL CIRCUIT

The Accessories Control circuit supplies buffered state, not state, and band code logic for use in controling the operation of the SU-125 Switching Unit and other accessories utilized for use in a programmer control EMI/RFI test system. The circuitry for the Accessories Control circuit is located on the

Signal Select board (A2A6).

The logic inputs for the state and band codes are received from the Logic board (A2A2). The circuit utilizes a series of buffers, inverters, and drivers to produce the necessary outputs.

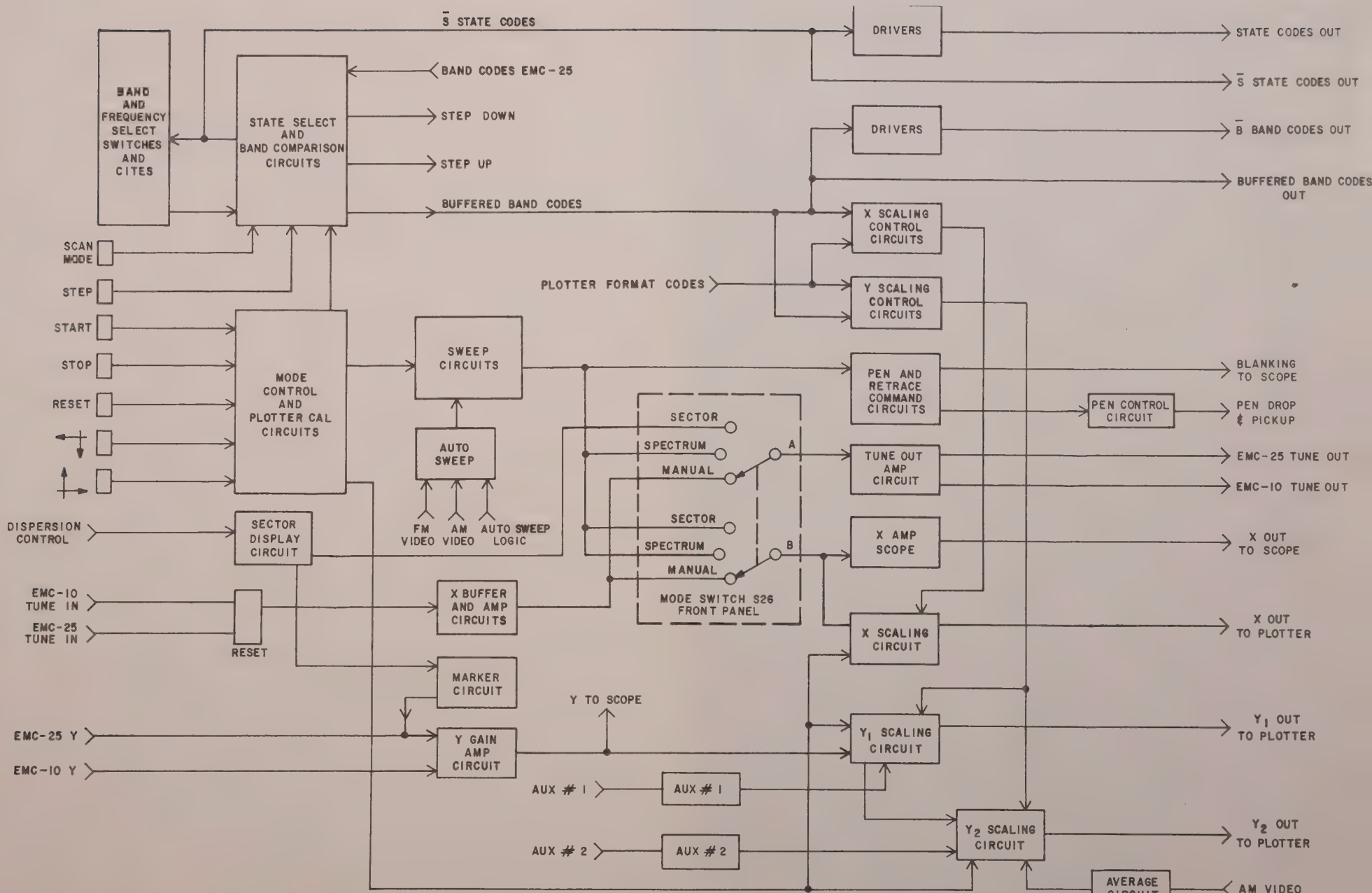

$\bar{S}$ STATE CODES
DRIVERS
STATE CODES OUT
$\bar{S}$ STATE CODES OUT
BAND AND FREQUENCY SELECT SWITCHES AND CITES
STATE SELECT AND BAND COMPARISON CIRCUITS
BAND CODES EMC-25
STEP DOWN
STEP UP
BUFFERED BAND CODES
DRIVERS
$\bar{B}$ BAND CODES OUT
BUFFERED BAND CODES OUT
X SCALING CONTROL CIRCUITS
Y SCALING CONTROL CIRCUITS
PLOTTER FORMAT CODES
SCAN MODE
STEP
START
STOP
RESET
MODE CONTROL AND PLOTTER CAL CIRCUITS
SWEEP CIRCUITS
AUTO SWEEP
FM VIDEO
AM VIDEO
AUTO SWEEP LOGIC
PEN AND RETRACE COMMAND CIRCUITS
BLANKING TO SCOPE
PEN CONTROL CIRCUIT
PEN DROP & PICKUP
SECTOR
SPECTRUM
MANUAL
A
TUNE OUT AMP CIRCUIT
EMC-25 TUNE OUT
EMC-10 TUNE OUT
DISPERSION CONTROL
SECTOR DISPLAY CIRCUIT
SECTOR
SPECTRUM
MANUAL
B
X AMP SCOPE
X OUT TO SCOPE
EMC-10 TUNE IN
EMC-25 TUNE IN
RESET
X BUFFER AND AMP CIRCUITS
MODE SWITCH S26 FRONT PANEL
X SCALING CIRCUIT
X OUT TO PLOTTER
MARKER CIRCUIT
Y TO SCOPE
EMC-25 Y
EMC-10 Y
Y GAIN AMP CIRCUIT
Y_1 SCALING CIRCUIT
Y_1 OUT TO PLOTTER
AUX # 1
AUX # 1
AUX # 2
AUX # 2
Y_2 SCALING CIRCUIT
Y_2 OUT TO PLOTTER
AVERAGE CIRCUIT
AM VIDEO

FIGURE 2-

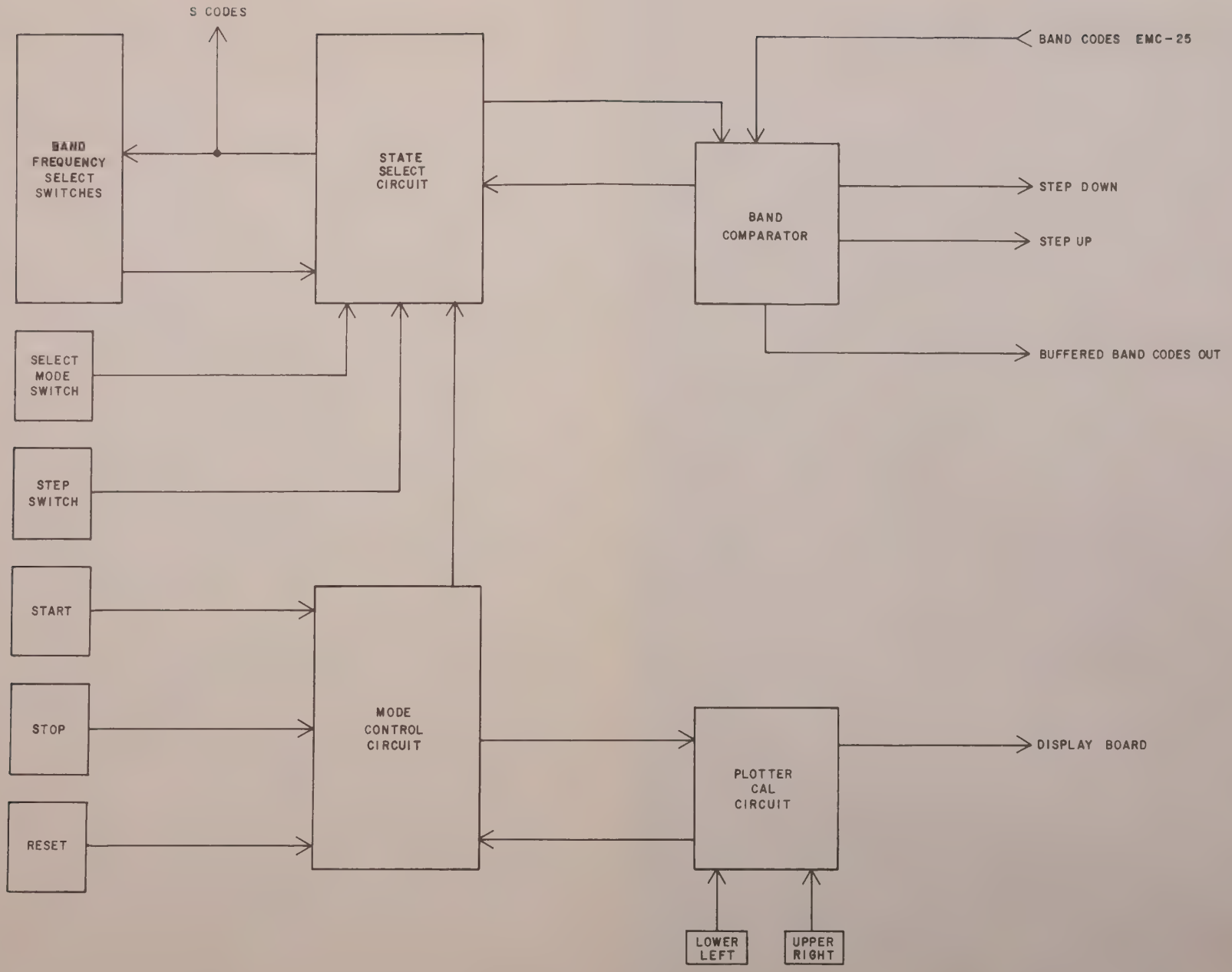

S CODES
BAND FREQUENCY SELECT SWITCHES
STATE SELECT CIRCUIT
BAND CODES EMC-25
BAND COMPARATOR
STEP DOWN
STEP UP
BUFFERED BAND CODES OUT
SELECT MODE SWITCH
STEP SWITCH
START
STOP
RESET
MODE CONTROL CIRCUIT
PLOTTER CAL CIRCUIT
DISPLAY BOARD
LOWER LEFT
UPPER RIGHT

FIGURE 2-2

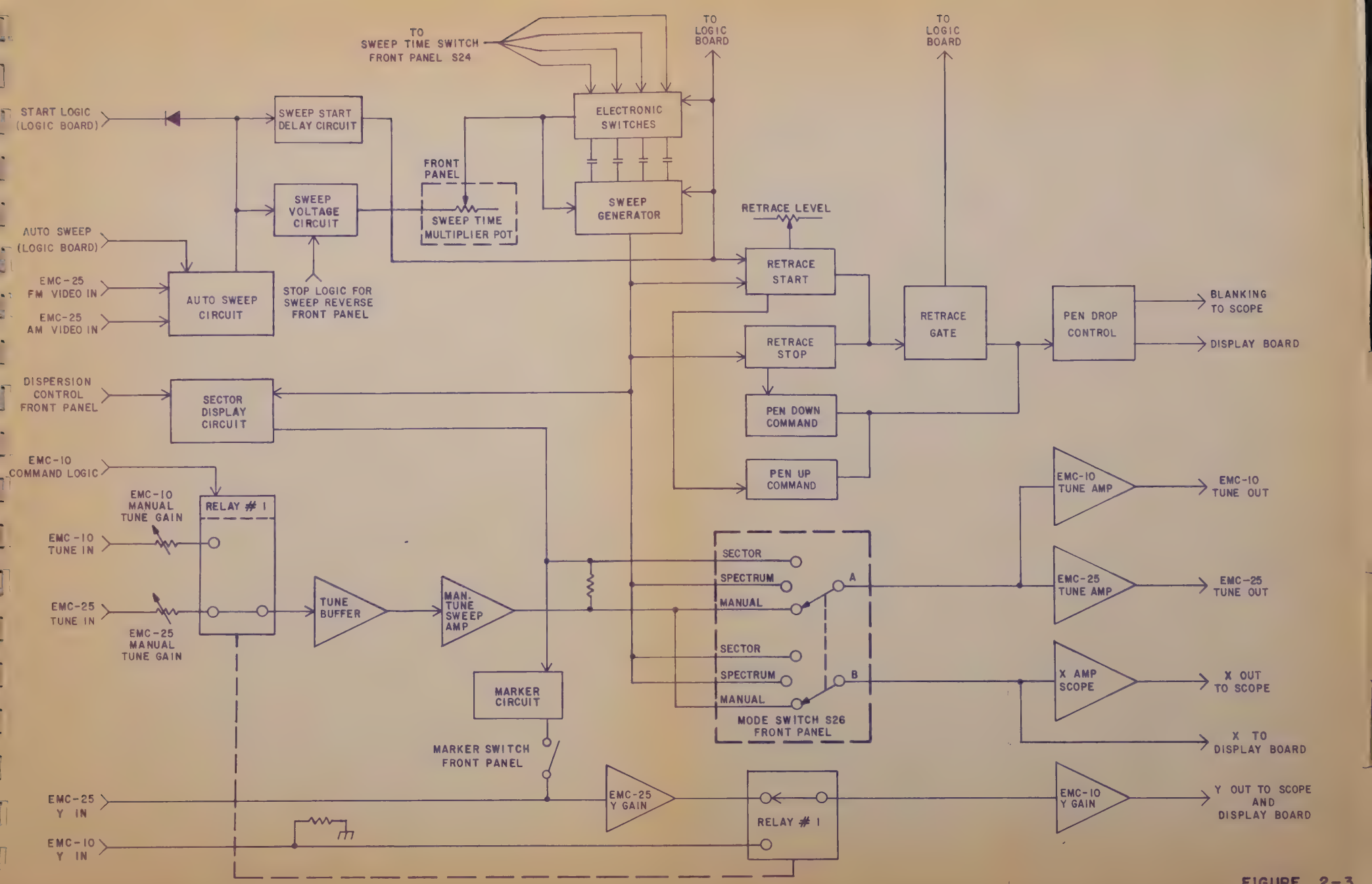

TO SWEEP TIME SWITCH FRONT PANEL S24
TO LOGIC BOARD
TO LOGIC BOARD
START LOGIC (LOGIC BOARD)
SWEEP START DELAY CIRCUIT
ELECTRONIC SWITCHES
FRONT PANEL
SWEEP VOLTAGE CIRCUIT
SWEEP TIME MULTIPLIER POT
SWEEP GENERATOR
RETRACE LEVEL
AUTO SWEEP (LOGIC BOARD)
EMC-25 FM VIDEO IN
EMC-25 AM VIDEO IN
AUTO SWEEP CIRCUIT
STOP LOGIC FOR SWEEP REVERSE FRONT PANEL
RETRACE START
RETRACE STOP
RETRACE GATE
PEN DROP CONTROL
BLANKING TO SCOPE
DISPLAY BOARD
DISPERSION CONTROL FRONT PANEL
SECTOR DISPLAY CIRCUIT
PEN DOWN COMMAND
PEN UP COMMAND
EMC-10 COMMAND LOGIC
EMC-10 MANUAL TUNE GAIN
RELAY # 1
EMC-10 TUNE IN
EMC-25 TUNE IN
EMC-25 MANUAL TUNE GAIN
TUNE BUFFER
MAN. TUNE SWEEP AMP
SECTOR
SPECTRUM
MANUAL
A
B
MODE SWITCH S26 FRONT PANEL
EMC-10 TUNE AMP
EMC-10 TUNE OUT
EMC-25 TUNE AMP
EMC-25 TUNE OUT
X AMP SCOPE
X OUT TO SCOPE
X TO DISPLAY BOARD
MARKER CIRCUIT
MARKER SWITCH FRONT PANEL
EMC-25 Y IN
EMC-10 Y IN
EMC-25 Y GAIN
RELAY # 1
EMC-10 Y GAIN
Y OUT TO SCOPE AND DISPLAY BOARD

FIGURE 2-3

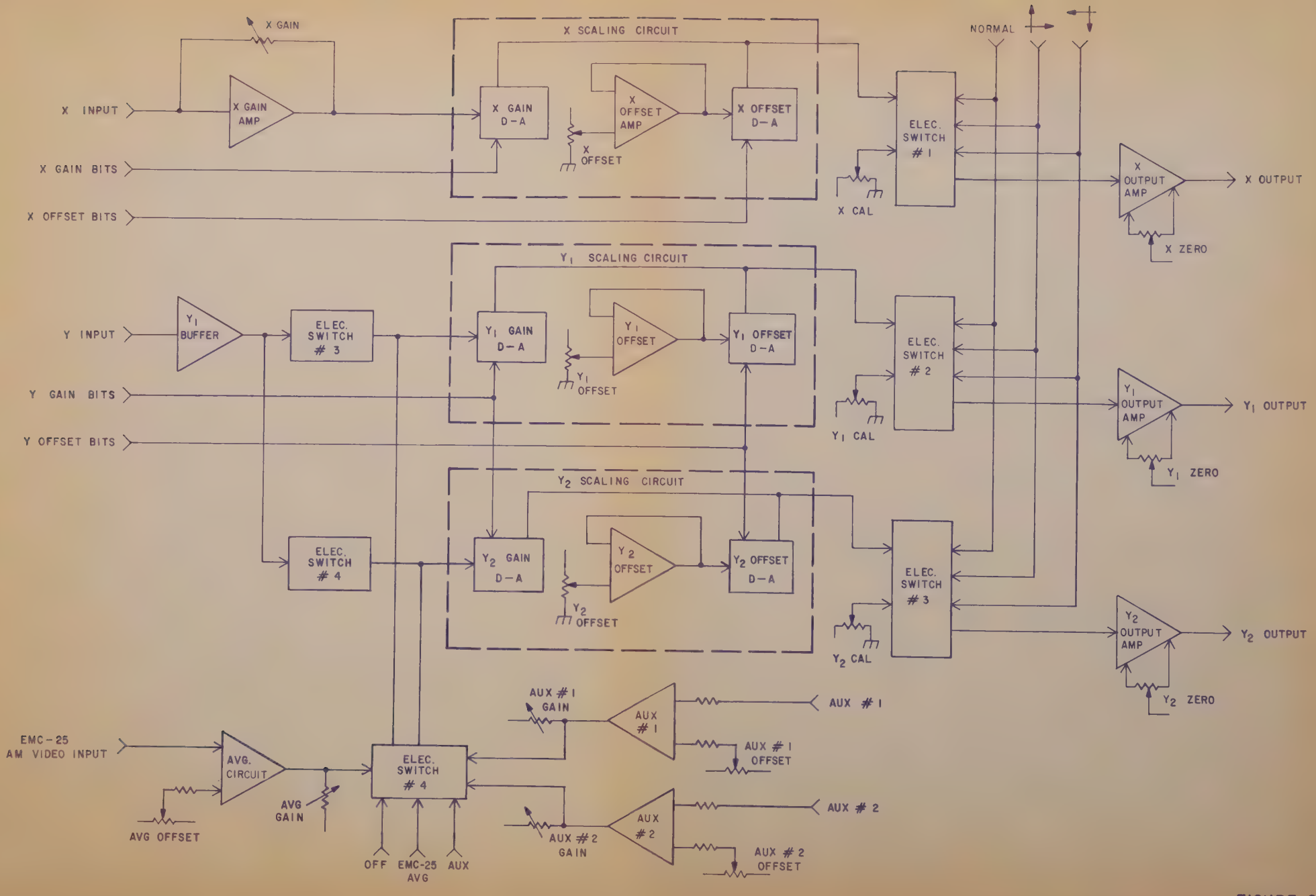

X GAIN
X INPUT
X GAIN AMP
X GAIN BITS
X OFFSET BITS
X SCALING CIRCUIT
X GAIN D-A
X OFFSET AMP
X OFFSET
X OFFSET D-A
NORMAL
ELEC. SWITCH #1
X CAL
X OUTPUT AMP
X OUTPUT
X ZERO
Y INPUT
Y1 BUFFER
ELEC. SWITCH #3
Y GAIN BITS
Y OFFSET BITS
Y1 SCALING CIRCUIT
Y1 GAIN D-A
Y1 OFFSET
Y1 OFFSET D-A
ELEC. SWITCH #2
Y1 CAL
Y1 OUTPUT AMP
Y1 OUTPUT
Y1 ZERO
Y2 SCALING CIRCUIT
ELEC. SWITCH #4
Y2 GAIN D-A
Y2 OFFSET
Y2 OFFSET D-A
ELEC. SWITCH #3
Y2 CAL
Y2 OUTPUT AMP
Y2 OUTPUT
Y2 ZERO
AUX #1 GAIN
AUX #1
AUX #1
AUX #1 OFFSET
EMC-25 AM VIDEO INPUT
AVG. CIRCUIT
AVG OFFSET
AVG GAIN
ELEC. SWITCH #4
OFF
EMC-25 AVG
AUX
AUX #2 GAIN
AUX #2
AUX #2
AUX #2 OFFSET

FIGURE 2-4

Section III

Operating Instructions

3.1 General

This section provides information and instructions for the operation of the Electro-Scan Programmer Model ESC-125C.

CAUTION

Read all information in this section before attempting operation. Improper operation may cause costly damage to the instrument.

3.2 Operational Precautions

3.2.1 Power Source Switch

An A.C. power source switch is located on the right hand side of the rear panel above the fuseholder. Check that the switch is set according to the A.C. power source being utilized Operation on a 230VAC line with the switch set to the 115VAC position can cause extensive circuit damage.

3.2.2 For successful operation with the ESC-125C, the following precautions should be taken as regards the Model EMC-25 Interference Analyzer:

a) That the Local/Remote Control switch is set to the Remote position (EMC-25 MK III model).

b) That the Manual/Sweep switch is set to the Manual position.

c) That the AFC switch is set to OFF.

3.3 Front Panel Controls

3.3.1 All controls for operation and utilization of the ESC-125C Programmer capabilities are located on the front panel. The location of each individual control is shown in Figure 3-1 and described in the following paragraphs.

3.3.2 Function Switches

The function switches are a band of six electronically interlocked pushbutton switches; STEP, START, STOP, RESET, and a pair of plotter normalization switches ↔ and ↕. Above each switch is a corresponding LED light which indicates when that function is activated.

3.3.2.1 START. The "START" button is used to initiate the programmer routine selected. The "START" light will activate and remain on for the duration of the routine.

3.3.2.2 STOP. The "STOP" button is used to halt the programmer routine at any point in the scan. When the "STOP" button is held depressed, the scan will back-up. It can be restarted at any point by pressing the "START" button again.

3.3.2.3 RESET. The "RESET" button returns the programmer to its initial starting position. The STOP, RESET, and ↕ lights will be activated, with an optional X-Y recorder pens going to the upper right hand corner of the recorder. Pressing the "START" button will initiate the programmer's routine at the starting point of the selected program.

3.3.2.4 STEP. The "STEP" button is used to advance the programmer routine one band at a time. When advanced to the next band desired, the programmer will automatically start the scan routine

at the beginning of the band.

3.3.2.5 PLOTTER NORMALIZATION (and). These two buttons are used to align the plotter pens to the lower left and upper right corners of the chart paper.

3.3.3 BAND and FREQUENCY SELECT Switches. The "BAND and FREQUENCY SELECT" switches are a total of sixteen toggle switches designated Band 0 through 15. They are used to select the frequencies to be scanned by the Model EMC-10 and/or Model EMC-25 Interference Analyzers.

The switch designated Band 0 corresponds to the Model EMC-10 Analyzer and its frequency range of 20 Hz to 50 kHz.

The switches designated Band 1 through Band 15 corresponds to the Model EMC-25 analyzer and the 15 bandstrips utilized by the analyzer to cover its frequency range of 10 kHz to 1000 MHz.

Above each switch is marked the number of the band it corresponds to and below the switch the frequency range covered. To include a particular frequency range in a programmer scan routine, the "BAND and FREQUENCY SELECT" switch that corresponds to that range is placed in the UP position. The number of bands selected for a particular routine can vary from a single band to all bands depending on the user's requirements, needs, or coverage.

Each "BAND and FREQUENCY SELECT" switch has a corresponding LED indicator light which is activated when the programmer routine is scanning or stopped in that particular band.

3.3.4 PEN #2 CONTROL SWITCH. This is a three position switch used in controlling the dual pen capabilities of the ESC-125C.

Specifically it controls the pen #2 of a dual pen X-Y recorder. Each position is described in the following paragraphs.

3.3.4.1 OFF --Ties the Pen #1 and Pen #2 together so that they function as a single pen. In this situation the Pen #2 ink cartridge is removed.

3.3.4.2 EMC-25 AVERAGE--In this position, the EMC-25 analyzer's DETECTION switch is set to the PEAK or QUASI PEAK position. The X-Y recorder will then produce simultaneous plots of EMC-25 average and EMC-25 peak readings of a RF signal input. The Peak plot will be on Pen #1, while the average plot will be on Pen #2.

3.3.4.3 AUXILIARY--This switch position has the auxiliary input jack (J3) supplying the inputs for the two plotter pens. This position is normally used when an optional CRM-25 is being utilized to permit the EMC-25 analyzer to take CISPR-type measurements. The X-Y recorder's dual pens would in this case be controlled by the #1 and #2 pen controls on the CRM-25 front panel. A typical application would be for simultaneous plots of CISPR Quasi Peak (on pen #2) and Peak (on pen #1).

The Pen #2 control switch and the functions associated with it are limited to use with the EMC-25 analyzer and its accessories.

3.3.5 SWEEP TIME SWITCH and SWEEP MULTIPLIER CONTROL

3.3.5.1 SWEEP TIME SWITCH. This is a four position rotary with time settings of 0.1, 1.0, 10, and 100 seconds. These set the minimum

sweep time per band. The 0.1 and 1.0 second ranges are intended for use with an external oscilloscope and automatically inhibit the plotter outputs.

3.3.5.2 SWEEP TIME MULTIPLIER CONTROL. This control is continuously variable from 1 to 10 times the SWEEP TIME switch settings. This provides a total sweep time range of 0.1 to 1000 seconds scan time per band.

3.3.6 AUTO-SWEEP SWITCH. This switch activates the auto-sweep circuit of the ESC-125C for use during a scan routine. The auto-sweep circuit permits the ESC-125C's sweep circuit to rapidly scan an EMC-25 band except when a narrow band signal is encountered. Thereupon, the sweep speed automatically slows down to allow an accurate X-Y recorder plot of the narrow band signal. The Auto-Sweep feature is limited to use with the EMC-25 analyzer.

3.3.7 MODE SWITCH. This is a three position rotary switch used to select one of three methods of programmer control: MANUAL, SPECTRUM, or SECTOR.

3.3.7.1 MANUAL. In this position of the MODE switch, control of the EMC-10 and EMC-25 Interference Analyzers revert to their respective front panel controls.

3.3.7.2 SPECTRUM. In this position of the MODE switch, the ESC-125C Programmer has control over the respective EMC-10 and EMC-25 Interference Analyzers, This allows the ESC-125C to perform the programmed routine selected by the operator.

3.3.7.3 SECTOR. This position of the MODE switch activates the dispersion control and allows the operator to expand any particular section of a band being scanned. The SECTOR function is normally used when an external oscilloscope is being utilized to provide CRT displays of the RF signals detected by the respective analyzers. An optional X-Y recorder can also be utilized with the SECTOR function to record the information from the analyzers. For this application the plotter coverage is expanded to a single page format per band.

3.3.7.3.1 DISPERSION CONTROL. This control, when activated by the SECTOR position, determines the sweep width around a predetermined center frequency. The control is continuously variable from minimum to maximum dispersion. Minimum dispersion has the widest sweep width producing a display/plot covering the entire band being scanned. Maximum dispersion has the narrowest sweep width producing a display/plot covering a small section of the band being scanned but expanded to cover the entire display/plot area.

3.3.8 MARKER FUNCTION SWITCH. This function is used when an external oscilloscope is being utilized as a spectrum analyzer by the ESC-125C. When activated it produces a visible indication on the oscilloscope display. In the SPECTRUM position of the MODE switch, it indicates where the tuning control of EMC-25 is set. In the SECTOR position of the MODE switch, the marker sets the center frequency around which the sweep width using the dispersion control is adjusted. The MARKER function is useable only with the

EMC-25 Analyzer (Band 1 through 15).

3.3.9 PLOTTER FORMAT SWITCH. This is a four position rotary switch used to select one of four plotter chart arrangements: 1x1, 4x4, 8x2, or 16x1. The ESC-125C Programmer automatically provides the correct gain and offset to the X-Y recorder for each different format.

3.3.9.1 Each format produces the following chart arrangements:

a) 1x1 FORMAT. This chart arrangement utilize the entire writing area of the X-Y recorder for a selected single band plot.

b) 4x4 FORMAT. This chart arrangement produces 4 bands across and 4 bands down over the writing area.

c) 8x2 FORMAT. This chart arrangement produces 8 bands across and 2 bands down over the writing area.

d) 16x1 FORMAT. This chart arrangement produces 16 bands across the writing area.

The plotter format selected by the operator will depend on the user's test requirements and specifications.

3.3.10 SCAN MODE SWITCH. This toggle switch is used to select whether a programmer routine is to be scanned once or repeated continuously.

3.3.10.1 SINGLE SCAN. In this position the ESC-125C Programmer scans through the selected routine once and at the end of the routine returns to the RESET position.

3.3.10.2 MULTI SCAN. In this position the ESC-125C Programmer repeatly scans the selected routine until the operator activates

the STOP or RESET button.

3.3.11 RF INPUT SWITCH. This toggle switch is utilized only when an optional SWITCHING UNIT SU-125 is connected to the ESC-125C Programmer. The SU-125 automatically switches between the different antennas and/or pickup devices used by the Model EMC-10 and Model EMC-25 Interference Analyzers during the normal course of EMI/RFI testing. The SU-125 accomplishes this task by utilizing the band coding and state logic from the programmer to activate relays to switch these different RF sources onto the RF signal inputs of the respective analyzers. The switch has two positions: NORMAL or CAL.

3.3.11.1 NORMAL. In this position the SU-125 operates as described above; switching the RF inputs of the respective analyzers between the different RF sources.

3.3.11.2 CAL. In this position, the ESC-125C Programmer sends a logic command to the SU-125 which disconnects the RF signal sources and allows the analyzers to be calibrated by either a CW signal or external impulse generator.

3.3.12 POWER SWITCH. This switch places the instrument in operation. The initial turn on will normally place the programmer in the RESET mode, with the STOP, RESET, and lights on.

3.4 Rear Panel

On the rear panel of the ESC-125C are located all the multipin and BNC connectors used in connecting the Model EMC-10 and Model EMC-25 Interference Analyzers, X-Y recorder, and various other external equipment to the programmer. Also located on the

rear panel are the line selector switch, fuse holder, and A.C. power input connector. The location of the various connectors and components is shown in Figure 3- 2 and described in the following paragraphs.

3.4.1 CONNECTORS

3.4.1.1 EMC-25 CONNECTOR (J1). 50 pin connector through which the control voltages, state and band logic, and other functions are routed via a control cable to and from the Model EMC-25 Interference Analyzer.

3.4.1.2 EMC-10 CONNECTOR (J2). 11 pin connector through which the control voltages are routed via a control cable to and from the Model EMC-10 Interference Analyzer.

3.4.1.3 AUXILIARY CONNECTOR (J3). 11 pin connector that is utilized when a CRM-25 Metering Module is being used in conjunction with a Model EMC-25 Interference Analyzer for CISPR-type measurement. The plotter output from the CRM-25 is connected in this instance to the auxiliary connector. Thus when the Pen #2 CONTROL switch is set to the AUXILIARY position; the inputs to the dual pens of the X-Y recorder are controlled by the CRM-25 front panel Pen #1 and Pen #2 switches.

3.4.1.4 X-Y PLOTTER CONNECTOR (J4). 11 pin connector which connects a dual or single X-Y plotter via a control cable to the ESC-125C Programmer. Since the ESC-125C has the built-in capability to drive a dual pen plotter, no additional external circuitry or special wiring is needed.

3.4.1.5 SU-125 CONNECTOR (J5). 34 pin connector which connects the

optional SWITCHING UNTI SU-125 via a control cable to the programmer. The SU-125 is used to automatically switch the various antennas and pickup devices used by the respective analyzers during a typical test routine.

3.4.1.6 ACCESSORY CONNECTOR (J6). 34 pin connector used for connecting various auxiliary equipment which need to utilize the state and band logic codes provided by the ESC-125C. An example of this is the Programmable Step Attenuator Model PSA-25.

3.4.1.7 A.C. POWER CONNECTOR (J7). Connects the ESC-125C Programmer via a power cord to the A.C. line power.

3.4.1.8 BNC CONNECTORS. A total of 5 BNC type connectors are located on the rear panel of the ESC-125C and are designated as follows:

a) EMC-25 VIDEO INPUTS: J8-AM VIDEO input from the EMC-25.
J9-FM VIDEO input from the EMC-25.

b) SCOPE OUTPUTS: J10-HORIZONTAL OUTPUT to oscilloscope.
J11 VERTICAL OUTPUT to oscilloscope.
J12 BLANKING (Z) OUTPUT to oscilloscope.

3.4.2 POWER SOURCE SWITCH. Slide switch which adjusts the power input to the ESC-125C for operation with either a 115 VAC or 230 VAC power source.

"CAUTION"

Check to be sure that the Power Source Switch setting corresponds to the AC power source being utilized. Operation on 230VAC with the switch set to 115VAC can cause extensive circuit damage.

3.4.3 FUSE. The FUSE requirements for operation on the respective

power sources are as follows:

115VAC Operation - 1amp SLO-BLO

230VAC Operation - ½amp SLO-BLO

3.5 Calibration and Alignment Procedures

Read the following sections thoroughly before attempting any of the procedures or operations described.

NOTE: Since the ESC-125C has the built in capability to drive either a single or dual pen plotter, the following procedures assume a dual pen plotter is being used.

3.5.1 PREOPERATIONAL ALIGNMENT PROCEDURE. This procedure is performed whenever a Model EMC-25 and/or Model EMC-10 Interference Analyzer is utilized with a previously aligned ESC-125C Programmer for the first time. The ESC-125C Programmer, Model EMC-25 and/or Model EMC-10 Interference Analyzers and X-Y plotter are connected together using Figure 3-3 as a quide. Apply the appropriate AC power to all equipment and allow a minimum 20 minute warm up period.

3.5.1.1 PLOTTER NORMALIZATION.

a) Set the ESC-125C front panel controls as follows:

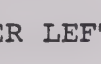
PEN #2 CONTROL SWITCH - OFF.

PLOTTER FORMAT SWITCH - 4x4 format.

b) For normal control settings as regards the X-Y recorder, see the appropriate instruction manual for the unit being utilized. The plotter pens are placed in the UP position during the first part of the procedure. For this procedure position a sheet of 4x4 format chart paper onto

the chart area of the recorder. Again follow the procedure given in the instruction manual for properly positioning the chart paper.

c) Push the ESC-125C RESET button; the STOP, RESET, and UPPER RIGHT lights will be activated. The X-Y recorder pens should be in the upper right hand corner of the chart.

d) Push the LOWER LEFT  switch; the X-Y recorder pens should now go the lower left hand corner of the chart, (In the 4x4 format, this will be the start of the Band 12 block). Adjust the X-Y recorder's X, Y_1, and Y_2 Zero adjustments to set the pens exactly on the lower left hand corner. Momentarily drop the plotter pens to check the positioning.

e) Push the UPPER RIGHT switch, the X-Y recorder pens should now go to the upper right hand corner of the chart, (In the 4x4 format, the upper corner of the Band 3 block). Adjust the X-Y recorder's X, Y_1, and Y_2 Range (Gain) adjustments to set the pens exactly on the upper right hand corner. Again momentarily drop the plotter pens to check the positioning.

f) Since there is some interaction between the Zero and Range adjustments, repeat steps d and e until no further adjustments are necessary.

g) The plotter normalization procedure described will be identical for all the formats utilized by the ESC-125C

(1x1, 4x4, 8x2, 16x1). The normalization procedure should always be performed whenever a new chart paper is placed onto the X-Y recorder.

3.5.1.2 EMC-25 ALIGNMENT

a) Set the EMC-25 front panel controls as follows:

LOCAL/REMOTE switch	- REMOTE.
AFC switch	- OFF.
TUNING switch	- MANUAL.
DETECTION switch	- CARRIER.
COARSE TUNING	- As required.
FINE TUNE	- Mechanical center.

b) Set the ESC-125C front panel controls as follows:

MODE switch	- MANUAL.
PEN #2 CONTROL switch	- OFF.
PLOTTER FORMAT switch	- 4x4.
SWEEPTIME switch	- 10 second position.
SWEEP MULTIPLIER switch	- As Required.
BAND/FREQUENCY SELECT switches	- BAND 3 UP, rest down to start.
SCAN switch	- MULTI-SCAN.

In order to perform the following procedure, the top and bottom covers of the ESC-125C will need to be removed. Four screws at the rear of each cover are removed and the cover slid back and out.

c) With the EMC-25 and ESC-125C front panel controls set as in step a and b, push the ESC-125C START switch. The EMC-25 should step to Band 3 and activate the Band 3

light on the ESC-125C front panel. After the EMC-25 stops in Band 3, push the ESC-125C STOP switch. The START light will go off and the STOP light will come on.

d) Set the EMC-25 cursor to the low end of the band.

NOTE: The test points for this and the other procedures in this section are double denoted. The first designation is for either a point on a given P.C. board or its connector, while the designation given in parenthesis is for a corresponding point on the Interconnection board (A2A7).

Using a digital voltmeter (four place accuracy perfered), measure and note the voltage on the sweep board (A2A3) 1.997mVdc connector A3J1-2(A2A7J23-2). (See Figure 3.4 for the five P.C. boards and Interconnection board locations. See Figures 3-6, 3-8, and 3-9 for the adjustment locations and connector arrangements for the sweep A2A3, Display A2A4, and Interconnection A2A7 boards respectively.) Next measure the voltage on A3J2-3 (A2A7J21-3) and adjust A3R99 (EMC-25 Tune Zero) to match the voltage on A3J1-2 (A2A7J23-2). This voltage should be near or at 0.000VDC.

e) Set the EMC-25 cursor to the high end of the band.

NOTE: If the EMC-25 start stepping when the cursor approaches or is at the high end of the band, turn the Retrace Level adjustment A3R25 in a CCW direction until the stepping stops.

Again measure and note the voltage on A3J1-2(A2A7J23-2). Next measure the voltage on A3J2-3(A2A7J21-3) and adjust A3R1(EMC-25 Manual adjust) to match the voltage on A3J1-2 (A2A7J23-2). This voltage should be near or at +1.500VDC.

f) Since there is some interaction between the two adjust-

ments, repeat steps d and e until no further adjustments are necessary.

g) Place the ESC-125C MODE switch into the SPECTRUM position put all BAND/FREQUENCY SELECT switches in the UP position except for Band 0, and push the START switch to place the programmer into the sweep mode.

h) Monitor the voltage on A3J2-3(A2A7J21-3) and note the voltage where the ESC-125C steps the EMC-25 to the next band. (To facilitate the taking of this measurement, slow the sweep speed down as the scan nears the end of the band block by utilizing the SWEEP MULTIPLIER switch to increase the sweep time). The end of band step voltage should be identical to the voltage for the high end of the EMC-25 band (previously set in step e). If not, adjust A3R25(Retrace Level adjust) in either a CW or CCW direction until the voltage level is equal to or just above the high end of the band voltage level.

3.5.1.3 EMC-10 ALIGNMENT

a) Set the EMC-10 front panel controls as follows:

BANDWIDTH	- WIDEBAND
WIDEBAND RANGE switch	- CAL position.
IMPEDANCE SELECTOR	- 50Ω.
FUNCTION SELECTOR (OUTPUT)	- CAL-TRACKING.
DETECTOR FUNCTION SELECTOR	- CARRIER.
FREQUENCY CONTROL	- As Required.
ZERO and AF CONTROLS	- As Required.

AUTO SCAN/MANUAL switch
(EMC-10 only) - MANUAL position.

b) Set the ESC-125C front panel controls as in paragraph 3.5.1.2 step b except for the following:

BAND/FREQUENCY SELECT switches - Band 0 UP, rest of the switches DOWN.

c) With the EMC-10 and ESC-125C front panel controls set as in steps a and b, push the ESC-125C START switch. The EMC-25 receiver should step to Band 0 (blank portion of EMC-25 scale) and the ESC-125C Band 0 should come on. After the EMC-25 stops in Band 0, push the ESC-125 STOP switch.

d) Set the EMC-10 Frequency control to 0.000Hz.

NOTE: Refer to the EMC-10 Instr ction Manual for the procedure on frequency calibrating the EMC-10 .

Measure and note the voltage on A3J1-1(A2A7J23-1). Next measure the voltage on A3J2-5(A2A7J21-5) and adjust A3R92 (EMC-10 Tune Zero) to match the voltage on A3J1-1(A2A7J23-1). This voltage should be near or at 0.000VDC.

e) Set the EMC-10 Frequency control to 50,000Hz. Again measure and note the voltage on A3J1-1(A2A7J23-1). Measure the voltage on A3J2-5(A2A7J21-5) and adjust A3R114(EMC-10 Manual Adjust) to match the voltage on A3J1-1(A2A7J23-1). The voltage should be near or at +1.500VDC.

NOTE: Adjustment A3R50 (EMC-10 Tune Gain) should be set full CCW before adjusting A3R114. A3R50

is adjusted when the user's test requirements or specifications dictate the need for the EMC-10 frequency range to be less than 50,000Hz. A3R50 is adjusted after A3R114 is adjusted to correspond to the voltage at the high end of the EMC-10 frequency dial (50,000Hz). Set the EMC-10 Frequency control to the frequency selected as the upper limit (example 16kHz). Measure the voltage on A3J2-5(A2A7J21-5) and adjust A3R50 to produce a voltage reading equal to the voltage noted when the Frequency control was set to 50,000Hz.

f) Since there is some interaction between the two adjustments repeat steps d and e until no further adjustments are necessary.

3.5.1.4 After performing the above alignment procedure, the Model EMC-25 and/or Model EMC-10 Interference Analyzers are ready for operational use with the ESC-125C Programmer.

The other parameter adjustments of a previously aligned ESC-125C (Y gains, offsets, etc...) are not affected by switching from one particular EMC-25 (or EMC-10) Analyzer to another.

3.5.2 ALIGNMENT PROCEDURE #2 (POST REPAIR). This procedure is utilized whenever one or more of the five P.C. boards located in the ESC-125C is repaired or replaced.

3.5.2.1 GENERAL. The ESC-125C Programmer contains five major P.C. boards plus a combination P.C. and wire wrap interconnection board. The five P.C. boards are; A2A2 Logic board, A2A3 Sweep board, A2A4 Display board, A2A5 PLOTTER OFFSET board, and A2A6 SIGNAL SELECT board. The Interconnection board is designated A2A7.

a) As a general rule, the complete alignment procedure is done when the Sweep A2A3 and/or Display A2A4 boards are repaired or replaced. These two boards contain between

them, the 27 potentiometer adjustments which are utilized to set up the unit parameters for the ESC-125C. This a complete alignment is necessary to insure proper functioning and operation of the ESC-125C.

b) When a Logic board A2A2 is repaired or replaced, the check in Paragraph 3.5.2.2 should be performed to insure the proper functioning of the Logic board.

c) When either a PLOTTER OFFSET A2A5 or SIGNAL SELECT A2A6 board is repaired or replaced, see Paragraphs 3.5.2.5 and 3.5.2.4 respectively.

d) To facilitate working on the unit and the P.C. boards; the top and bottom covers of the ESC-125C are removed. Remove the four screws from the rear of each cover and slide the cover back until it clears the slots holding the cover.

3.5.2.2 LOGIC BOARD (A2A2) CHECK. This check should be performed whenever a Logic board (A2A2) is replaced/repaired to insure that the board is functioning correctly.

NOTE: Unless otherwise stated, the following conditions are assumed to be in effect during the performance of the procedures outlined in the following paragraphs:

1) All units connected to the AC power source being utilized.

2) Model EMC-25 Interference Analyzer connected to the ESC-125C Programmer. Model EMC-10 connected up to ESC-125C and utilized only when so stated in the procedure.

3) The ESC-125C Programmer is connected to a dual pen X-Y recorder.

4) The X-Y recorder is set according to the

unit's instruction manual for normal operation.

5) All units have been warmed up for a m nimum period of 20 minutes; unless so stated in the procedure.

a) During the first part of the procedure, set the EMC-25 LOCAL/REMOTE switch to the LOCAL position and the X-Y recorder Servo to OFF.

b) Turn the ESC-125C power on and note that the STOP, RESET, and UPPER RIGHT ↑→ lights come on. Put all BAND/FREQUENCY SELECT switches down.

c) Put the SCAN switch in MULTI-SCAN position and push the START switch. The START should be activated, with the BAND/FREQUENCY SELECT lights sweeping from Band 0 to Band 15 continuing until the STOP switch is pushed. When the STOP switch is pushed, the STOP light should be activated and the scan stopped in the band it has reached at that point in time.

d) Change the SCAN switch to SINGLE-SCAN, push the RESET; then the START switch. After going through the same sequence of events as explained in steps b and c, the scan should again sweep through the bands from Band 0 to Band 15. Upon reaching Band 15, the RESET, STOP, and UPPER RIGHT ↑→ lights should come on.

e) Put the EMC-25 LOCAL/REMOTE switch to the REMOTE position. Put the ESC-125C BAND/FREQUENCY SELECT switches in the UP position. Push the START switch, then using the STEP switch; step through the bands. In single

scan the results given in step d should occur. Note that the EMC-25 has stepped along in a forward direction as the STEP switch is pushed.

f) Check that the ESC-125C will step the EMC-25 in a reverse direction. Put the ESC-125C BAND/FREQUENCY SELECT switches for Band 12 and Band 15 UP, all other switches DOWN. Put the SCAN switch to the MULTI-SCAN position and using the STEP switch step to the Band 15 position. When going to Band 12, the BAND/FREQUENCY SELECT lights will sweep through from Band 0 to Band 12, but the EMC-25 should step in a reverse direction from Band 15 to Band 12.

g) Push the RESET switch, the results noted in step d should occur.

3.5.2.3 ESC-125C PARAMETERS ALIGNMENTS

3.5.2.3.1 GENERAL

a) This procedure is performed whenever a Sweep A2A3 and/or Display A2A4 board is repaired or replaced.

b) See Figure 3-8 and 3-9 for location of the board adjustments.

c) See Figure 3-6 for Interconnection A2A7 board location and connector arrangement.

d) See Section 4.3.2 for P.C. board removal and replacement procedure.

e) See Section 4.3.2.4 for P.C. board testing procedure.

f) When taking voltage measurements, the use of a four place digital voltmeter is recommended for the accuracy required.

3.5.2.3.2 PLOTTER CALIBRATION ADJUSTMENTS. This procedure sets the voltages required to "CAL" the upper right and lower left corners of the X-Y recorder's chart paper.

a) The adjustments utilized for this procedure are located on the Display board (A2A4).

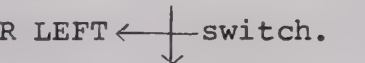
b) Allow the nominal warm up time for the X-Y recorder being used (see unit's instruction manual) and set the X, Y_1, and Y_2 Zero and Range (Gain) adjustments to mid-range. Use 4x4 format chart paper during this part of the procedure.

c) Perform the Logic board check given in Paragraph 3.5.2.2 to insure proper operation of the Logic board (A2A2).

d) The ESC-125C should be in the RESET mode with the STOP, RESET, and UPPER RIGHT lights on. If not, push the RESET switch.

e) Using a clip lead ground A4J1-1(A2A7J25-1)[X Input]. Set all BAND/FREQUENCY SELECT switches DOWN except for Band 12 and push the START switch. The EMC-25 should step to Band 12, the ESC-125C Band 12 light should be activated, and the plotter pens positioned in the Band 12 chart block. Measure on A4J3-2 (A2A7J27-2)[X Output], adjust A4R38 (X Output Amplifier Zero) for 0.000VDC.

PUSH THE RESET SWITCH PRIOR TO —→

f) Push the LOWER LEFT  switch. The LOWER LEFT light should be activated.

1) Measure on A4J3-2(A2A7J27-2) X Output , adjust A4R31 (X CAL Zero) for 0.000VDC.

2) Measure on A4J3-6(A2A7J27-6) Y_1 Output , adjust A4R46 (Y_1 Output Amplifier Zero) for 0.000VDC.

3) Measure on A4J4-7(A2A7J30-7) Y_2 Output , adjust A4R54 (Y_2 Output Amplifier Zero) for 0.000VDC.

g) Push the UPPER RIGHT switch. The UPPER RIGHT light should be activated.

1) Measure on A4J3-2(A2A7J27-2) [X Output] , adjust A4R33 (X CAL Gain) for +1.500VDC.

2) Measure on A4J3-6(A2A7J27-6) [Y_1 Output] , adjust A4R41 (Y_1 CAL) for +2.000VDC.

3) Measure on A4J4-7(A2A7J30-7) [Y_2 Output] , adjust A4R49 (Y_2 CAL) for +2.000VDC.

h) Since there is some interaction between adjustments, repeat steps e through g until no further readjustments are necessary.

i) Perform the Plotter Normalization Procedure in paragraph 3.5.1.1 to verify X-Y recorder and ESC-125C Programmer compatibility.

3.5.2.3.3 X OFFSET and GAIN ADJUSTMENTS

a) Set the EMC-25 front panel controls as follows:

LOCAL/REMOTE switch	- REMOTE position.
AFC switch	- OFF.
TUNING switch	- MANUAL.
DETECTION switch	- CARRIER.

COARSE TUNING (CURSOR) - as required.

FINE TUNE - mechanical center.

b) Set the ESC-125C front panel controls as follows:

MODE switch - MANUAL.

PEN #2 CONTROL switch - OFF.

PLOTTER FORMAT - 4x4.

SWEEPTIME switch - 10 second position.

SWEEP MULTIPLIER switch - as required.

BAND/FREQUENCY SELECT switch - Band 3 UP, rest DOWN to start.

SCAN switch - MULTI-SCAN.

c) Perform the EMC-25 Alignment Procedure given in paragraph 3.5.1.2. This will check out the EMC-25 manual tune voltage alignment with the ESC-125C and the sweep circuitry of the ESC-125C.

d) For this procedure, remove the Pen #2 ink cartridge from its holder on the X-Y recorder. With the EMC-25 and ESC-125C front panel controls set as in steps a and b, push the ESC-125C START switch. When the EMC-25 has stepped to Band 3 and stopped with the ESC-125C Band 3 light on, push the ESC-125C STOP switch.

e) Set the EMC-25 cursor (COARSE TUNING) at the low end of Band 3. Adjust A4R9(X Offset) to position the plotter Pen #1 at the starting edge of the Band 3 block.

f) Set the EMC-25 cursor at the high end of Band 3. Adjust A4R4(X Gain) to position the plotter Pen #1 over the end of the Band 3 block.

g) Since there are some interaction between adjustments, repeat steps e and f until no further readjustments are necessary.

h) Put the ESC-125C MODE switch to the SPECTRUM position, sweep time between 60 and 100 seconds, and the BAND/FREQUENCY SELECT switches UP except for Band 0. Push the

ESC-125C START switch to start the programmer sweeping.

i) Note the points where the pen drops and lifts. These points should be within 1/32 of an inch of the start and end lines of the band blocks. If not, readjust A4R9 and A4R4 slightly to bring the points within tolerance.

3.5.2.3.4 Y_1 and Y_2 GAINS and OFFSETS. This procedure utilizes both Analyzers.

a) Set the EMC-25 front panel controls as in paragraph 3.5.2.3.3 step a.

b) Set the EMC-10 front panel controls as follows:

BANDWIDTH SELECTOR	- WIDE BAND.
WIDEBAND RANGE switch	- CAL position.
IMPEDANCE SELECTOR	- 50Ω.
FILTER SELECTOR	- 500kHz.
FUNCTION SELECTOR	- CAL-TRACKING.
DETECTOR FUNCTION SELECTOR	- CARRIER.
FREQUENCY CONTROL	- 10,000Hz.
AUTO SCAN/MANUAL switch (EMC-10 only)	- MANUAL.

c) Set the ESC-125C front panel controls as follows:

MODE switch	- MANUAL.
PEN #2 CONTROL switch	- OFF to start.
PLOTTER FORMAT	- as required.
SWEEP TIME switch	- 10 second position.
SWEEP MULTIPLIER switch	- as required.
BAND/FREQUENCY SELECT switches	- all band switches UP.

SCAN switch - MULTI-SCAN.

AUTO-SCAN switch - OFF.

NOTE: During the course of the following procedure, the PLOTTER FORMAT switch will be switched between the 1x1 and 4x4 formats. Set up and normalizes the X-Y plotter with the 4x4 format and respective chart paper. When the procedure calls for a change from the 4x4 to the 1x1 format, just change the ESC-125C PLOTTER FORMAT switch to the 1x1 position. The chart paper need not be changed.

d) With the EMC-10, EMC-25, and ESC-125C front panel controls set as in steps a through c, push the ESC-125C START switch. When Band 0 (EMC-10) is reached (Band 0 light on), push the ESC-125C STOP switch. For this part of the procedure, the Pen #2 ink cartridge is placed back into its holder on the X-Y recorder.

e) Adjust the EMC-10 GAIN CONTROL for a full scale reading in the CAL position. With the PLOTTER FORMAT switch in the 1x1 format position, measure the voltage on A4J3-6(A2A7J27-6)[Y_1 Output] and adjust A3R76(EMC-10 Y Gain) for +2.000VDC.

NOTE: If an EMC-10 analyzer is not available, substitute a -1.500VDC voltage on A3J1-3(A2A7J23-3)[EMC-10 Y Input] for a full scale EMC-10 meter reading. This step must be done before setting the EMC-25 Y Gains.

f) Utilizing the ESC-125C STEP switch, step to Band 3 of the EMC-25 Analyzer. After reading Band 3, push the ESC-125C STOP switch and feed a 110kHz CW signal into the RF input of the EMC-25. Peak the EMC-25 for a maximum meter reading, then adjust the Gain control for a full scale meter indication.

g) Measure the voltage on A4J3-6(A2A7J27-6)[Y_1 Output] and adjust A3R97(EMC-25 Y Gain) for +1.500VDC.

h) Change the PLOTTER FORMAT switch to the 4x4 position. Remove the CW signal from the EMC-25 RF input and reduce the meter level to the -40dB point or just below.

i) In the 4x4 format, the plotter pens should be located in the Band 3 block. Adjust A4R17(Y_1 Offset) to match the Pen #1 to the bottom line of the Band 3 block.

j) Adjust A4R26 (Y_2 Offset) to match the Pen #2 to the bottom line of the Band 3 block.

k) Reapply the 110kHz CW signal to the EMC-25 RF input and peak/adjust the EMC-25 for a full scale meter reading. Change the EMC-25 DETECTION switch to the PEAK position.

l) Set the ESC-125C PEN #2 CONTROL to the EMC-25 AVERAGE position, the PLOTTER FORMAT switch to 1x1, and connect (via a coaxial cable) the EMC-25 AM VIDEO output to the AM VIDEO input (J8) on the rear panel of the ESC-125C.

m) Measure on A4J4-7(A2A7J30-7)[Y_2 Output] and adjust A4R60 (Average Gain Pen #2) for +1.500VDC. This will match the Pen #2 and Pen #1 amplitude readings.

n) Remove the CW signal from the EMC-25 RF input and reduce the meter level reading to the -40dB point or just below. Put the PLOTTER FORMAT switch to the 4x4 position and adjust A4R63 (Average Offset Pen #2) to match the Pen #2 to the bottom line of the Band 3 block.

3.5.2.3.5 AUXILIARY #1 and #2 GAIN and OFFSET ADJUSTMENTS.

a) Set the ESC-125C front panel controls as in paragraph 3.5.2.3.4 step c except for the following:

PEN #2 CONTROL switch - AUXILIARY position.

PLOTTER FORMAT switch - 1x1 format.

BAND/FREQUENCY SELECT switches - Band 3 UP, the rest DOWN.

b) Set the EMC-25 front panel controls as in paragraph 3.5.2.3.4 step a. The EMC-25 is not utilized directly for any of the measurements or adjustments given in the procedure but is needed to provide the proper band and state codes to the ESC-125C.

c) Apply a +1.500VDC voltage (using an external DC power supply) between the Auxiliary $+Y_1$ input and $-Y_1$ ground. This can be accomplished in two ways:

1) On the Auxiliary connector (J3); pin M($+Y_1$) and Pin F($-Y_1$).

2) On the Interconnection board (A2A7); J30-1($+Y_1$) and J30-2($-Y_1$).

d) Measure on A4J3-6(A2A7J27-6)[Y_1 Output] and adjust A4R70 (Auxiliary Gain Pen #1) for +1.500VDC.

e) Next apply the +1.500VDC voltage between the Auxiliary $+Y_2$ input and $-Y_2$ ground. Again this can be accomplished in two ways:

1) On the Auxiliary connector (J3); pin H($+Y_2$) and pin J($-Y_2$).

2) On the Interconnection board (A2A7); J30-4($+Y_2$) and J30-3($-Y_2$).

f) Measure on A4J4-7(A2A7J30-7)[Y_2 Output] and adjust A4R68(Auxiliary Gain Pen #2) for +1.500VDC.

g) Change the PLOTTER FORMAT switch to the 4x4 format, the pens should be in the Band 3 block. With no inputs, adjust A4R72 (Auxiliary #1 Offset) and A4R66 (Auxiliary #2 Offset) to match Pen #1 and Pen #2 to the base line of the Band 3 block.

3.5.2.3.6 SWEEP - BALANCE and ZERO ADJUSTMENTS. This procedure sets up the A2A3 SWEEP board sweep generator circuit balance and zero adjustments for the ramp voltage. This is adjusted to prevent the plotter pens from drifting in either direction when the STOP switch is pushed to stop the sweep in particular band block.

a) Set the EMC-25 and ESC-125C front panel controls as per paragraph 3.5.2.3.4 steps a and c except for the following:

ESC-125C PLOTTER FORMAT switch - 4x4 format.
MODE switch - SPECTRUM.

b) Push the ESC-125C START switch and allow the ESC-125C to start sweeping through its scan routine. Choose any EMC-25 band between Band 1 through 10 and when the selected band has sweeped about 75% of the band block, push the ESC-125C STOP switch.

c) Measure the voltage on A3J2-13(A2A7J21-3)[Sweep Ramp voltage]. The voltage should remain constant(the voltage will be positive voltage measuring between +5.5 to +7.5VDC); if drifting in either direction adjust

A3R7 (Sweep Balance) and A3R10 (Zero Sweep) until the drift is stopped.

d) A very slight drift towards the lower end of the band block is tolerable if the drift rate is 50 mv/hr or less.

NOTE: The BALANCE ADJUST (A3R7) will have the greatest effect on the drift while the ZERO ADJUST (A3R10) is used to "fine tune" the balance. These adjustments can be made in either a CW or CCW direction.

3.5.2.3.7 AUTO SWEEP CIRCUIT CHECK. This procedure checks out the functioning of the ESC-125C AUTO-SWEEP circuit.

a) Set the EMC-25 and ESC-125C front panel controls as per paragraph 3.5.2.3.4 steps a and c except for the following:

ESC-125C	BAND FREQUENCY SELECT switch	- Band 0 DOWN, all other switches, UP.
	PLOTTER FORMAT switch	- 4x4 format.
	SWEEP MULTIPLIER	- X1 end.
	MODE switch	- SPECTRUM

Connect (via a coaxial cable) the FM VIDEO output of the EMC-25 to the FM VIDEO input (J9) on the rear panel of the ESC-125C.

b) Apply a CW signal to the RF input of the EMC-25. The frequency can be between 10kHz to 1000MHz and at a level which will produce a full scale meter reading on the EMC-25.

c) Push the ESC-125C START switch to initiate the scan routine and place the AUTO SCAN switch in the ON position. The ESC-125C Programmer will rapidly scan through each

band until the band block and that point in the band where the signal is located. Upon encountering the signal the scan speed will slow and nearly stop at the peak of the signal. After passing through the signal, the scan should resume its normal sweep speed.

3.5.2.3.8 SCOPE DISPLAY CHECK. This procedure checks out the operation of the ESC-125C Programmer with a conventional oscilloscope which produces a spectrum display of the EMC-25 band being scanned.

a) Set the EMC-25 front panel controls as follows:

LOCAL/REMOTE switch	- REMOTE switch.
AFC switch	- OFF.
DETECTION switch	- as required.
TUNING switch	- MANUAL.
COARSE TUNING (cursor)	- as required.
FINE TUNING	- Mechanical center.

b) Set the ESC-125C front panel controls as foll

MODE switch	- SPECTRUM.
PEN #2 CONTROL switch	- OFF.
SWEEP TIME switch	- 0.1 second position.
SWEEP MULTIPLIER switch	- X1 position to start.
BAND/FREQUENCY SELECT switches	-Band 0 DOWN, all other switches UP.
SCAN switch	- MULTI-SCAN.
DISPERSION CONTROL	- MINIMUM to start.
MARKER switch	- OFF to start.

c) Connect the HORIZONTAL (J10), VERTICAL (J11), and

BLANKING (J12) outputs via c axial cables from the rear panel of the ESC-125C to their respective counterparts on the oscilloscope.

d) With the EMC-25 and ESC-125C front panel controls set as in steps a and b, push the ESC-125C START switch. Using the ESC-125C STEP switch, step the EMC-25 to Band 3. Apply a 110kHz CW signal to the RF input of the EMC-25 and peak/adjust the signal for a full scale EMC-25 meter reading.

e) Place the EMC-25 DETECTION switch into the SLIDEBACK position. The SLIDEBACK CONTROL should be set full CCW. When the oscilloscope has been properly adjusted, a complete spectrum display for the Band 3 will appear on the oscilloscope display.

NOTE: For oscilloscope operation with an external horizontal input (X AMP) refer to the instruction manual for the oscilloscope being utilized. For use with an ESC-125C, the external horizontal input and the vertical input should be D.C. coupled.

f) Turn the MARKER switch on, a fixed width blip will appear on the oscilloscope display. In the SPECTRUM mode, the MARKER signal blip corresponds to the EMC-25 tuning control cursor and occupies a position on the oscilloscope display relative to the position of the cursor on the EMC-25 band. Position the MARKER signal over the center of the CW signal presentation on the oscilloscope display using the EMC-25 cursor.

g) Set the ESC-125C MODE switch to the SECTOR position.

The MARKER signal blip should now be fixed in the center of the scope display. If not, adjust A3R20 (Sector Display positioning)to position the MARKER signal blip in the center of the oscilloscope display screen.

h) The DISPERSION CONTROL is activated only in the SECTOR position of the MODE switch and controls the sweep width around the MARKER signal blip. In minimum (MIN) dispersion the sweep width covers the full range of the band, while maximum (MAX) dispersion covers a small portion of the band spread out over the oscilloscope display.

3.5.2.4 SIGNAL SELECT BOARD A2A6. This procedure is performed whenever a SIGNAL SELECT board (A2A6) is repaired or replaced. It verifies the proper functioning of the SIGNAL SELECT board which produces the state and band code logic utilized by the SU-125 Switching Unit and the PSA-25 Programmable Step Attenuator. These units are connected via control cables to the ESC-125C rear panel connector A3J5(SU-125) and connector A3J6 (ACESSORY - used for the PSA-25).

a) Set the EMC-25 front panel controls as in paragraph 3.5.2.3.4 step a.

b) Set the ESC-125C front panel controls as in paragraph 3.5.2.3.4 step c.

c) Connect a SU-125 Switching Unit to the ESC-125C rear panel connector A3J5.

d) With the EMC-25 and ESC-125C front panel controls set

as in steps a and b, push the ESC-125C RESET switch and then the ESC-125C START switch. Utilize the ESC-125C STEP switch to step through the EMC-25 bands (1-15) in order. Refer to the SU-125 Instruction Manual for complete information concerning the operation of the switching unit. The SU-125 being utilized for the test should respond to the ESC-125C logic commands in the manner described by manual for normal operations.

e) Repeat step d with a PSA-25 Programmable Step Attenuator connected to the ESC-125C rear panel connector A3J6 (Accessory). Refer to the PSA-25 Instruction Manual for complete information on the operation and use of the unit.

f) If a SU-125 or PSA-25 is not available, refer to Figure 3-16 and Figure 3-17 respectively for information concerning the rear panel connectors.

3.5.2.5 PLOTTER OFFSET BOARD A2A5. This procedure is performed whenever a PLOTTER OFFSET board A2A5 is repaired or replaced. The PLOTTER OFFSET board supplies the necessary logic coding to the DISPLAY board (A2A4) to produce the correct offset voltage for each plotter format utilized by the ESC-125C.

a) Set the EMC-25 front panel controls as in paragraph 3.5.2.3.4 step a.

b) Set the ESC-125C front panel controls as in paragraph 3.5.2.3.4 step c except for the following:

MODE switch - SPECTRUM.

c) Place the PLOTTER FORMAT switch in the 4x4 position. Insert a sheet of 4x4 format paper onto the X-Y recorder and normalize the plotter as per paragraph 3.5.1.1.

d) Push the RESET switch, then the START switch. The ESC-125C Programmer should go to the Band 0 block and start sweeping.

e) Note that the ESC-125C as it scans and steps through each EMC-25 band, properly positions the plotter pens in the correct band block and that the spacing between blocks is correct in both the vertical and horizontal axis.

f) Repeat steps c, d, and e with the PLOTTER FORMAT switch in 8x2 and utilizing 8x2 format chart paper.

g) Repeat steps c, d, and e with the PLOTTER FORMAT switch in 16x1 and utilizing 16x1 format chart paper.

h) Check single band plot by placing the PLOTTER FORMAT switch to the 1x1 position. Note that a single band covers the entire plotting area of a 1x1 chart paper.

3.5.2.6 After completion of any/all of the above procedures, the unit should be cleaned up (if necessary) and the covers reinstalled. The ESC-125C Programmer is now ready for normal operations.

3.6 Operating Procedures

This section gives instructions and procedures which should guide the operator in the proper utilization of the ESC-125C

Programmer. This includes the operation of the ESC-125C with the Modle EMC-25 and/or EMC-10 Interference Analyzers plus the use of either a X-Y recorder plot or CRT display (using a conventional oscilloscope) to present the data obtained.

3.6.1 GENERAL POWER UP PROCEDURE

3.6.1.1 Before power is applied to the ESC-125C the following should be checked:

a) The ESC-125C AC power source switch is set to correspond to the AC power source being used.

b) That all the equipment to be used with the ESC-125C (EMC-25, EMC-10, etc...) is connected together as per Figure 3-3 (ESC-125C INTERCONNECTION DIAGRAM).

c) The AC power source switches on the other equipment being utilized is also set to correspond to the AC power source being used.

3.6.1.2 Turn on the ESC-125C, the STOP, RESET, and UPPER RIGHT ( ) lights should be activated. Allow a minimum warm up period of 20 minutes. Turn on the remaining equipment and allow the minimum warm up period for each piece of equipment as per the respective instruction manuals (the normal time is usually 20-30 minutes).

3.6.1.3 Refer to the respective instruction manuals for the EMC-25 and/or EMC-10 Analyzers for information concerning remote or external control modes of operation.

3.6.1.4 If the EMC-25 and/or EMC-10 Analyzers are being utilized

with the ESC-125C for the first time, perform the PREOPERATIONAL CALIBRATION Procedure as given in paragraph 3.5.1.

3.6.1.5 The ESC-125C Programmer, EMC-25 and/or EMC-10 Analyzers, and X-Y recorder and/or oscilloscope are now ready for operational use.

NOTE: In the following two procedures the following assumptions are made:

a. The ESC-125C Programmer and the EMC-25 and/or EMC-10 Analyzers have been aligned to one another.

b. The X-Y recorder and/or oscilloscope controls have been adjusted for normal operational use as per the respective instruction manuals.

c. The EMC-25 and/or EMC-10 Analyzers are set for operation in the remote or external control mode.

3.6.2 ESC-125C/X-Y RECORDER OPERATION. This section refers to the operation of an ESC-125C Programmer utilizing a X-Y recorder to produce hard copies of the data obtained by the respective analyzers.

3.6.2.1 Refer to Figure 3-3 (ESC-125C INTERCONNECTION DIAGRAM) for equipment interconnections.

3.6.2.3 The ESC-125C Programmer, X-Y recorder, EMC-25 and/or EMC-10 Analyzers, and accessories are now ready for operational use.

3.6.2.4 OPERATION

Select the frequencies/bands to be incorporated into the programmed scan routine by placing the BAND/FREQUENCY SELECT switch for that particular band in the UP position. To exclude

a band from the programmed scan routine, place that particular BAND/FREQUENCY SELECT switch in the DOWN position. Always place the Band 0 switch in the DOWN position if the EMC-10 Analyzer is not part of the test setup.

Use the ESC-125C PLOTTER FORMAT switch to select the plotter format desired (1x1, 4x4, 8x2, 16x1). Place the appropriate format chart paper onto the X-Y recorder's writing area and perform the PLOTTER NORMALIZATION procedure (see paragraph 3.6.2.2). Whenever the plotter format or chart paper is changed during the course of a test program, the PLOTTER NORMALIZATION procedure should be performed to maintain accuracy.

The ESC-125C MODE switch sets the method of programmer control. In the MANUAL position, control of the respective analyzers reverts to the unit's front panel. In the SPECTRUM position, the ESC-125C has control of the analyzers and performs the programmed routine selected by the operator. The SECTOR position activates the DISPERSION control and allows the operator to expand a selected portion of a particular band for more detailed analysis. This position is normally used when an oscilloscope is being utilized with the ESC-125C. When used in conjunction with an X-Y recorder plot, the FORMAT switch is set to the 1x1 position and only one band is selected to be scanned.

NOTE: On the ESC-125C, selecting either the SECTOR position of the MODE switch or placing the FORMAT switch to the 1x1 position does not automatically program the ESC-125C for a single scan sweep of one band. In order to accomplish this, all BAND/FREQUENCY SELECT switches must be in the DOWN position except

for the band in question. That particular switch is placed in the UP position, which along with the FORMAT switch in 1x1 position, the SCAN switch is SINGLE SCAN, and the MODE switch either in SECTOR or SPECTRUM produces a single sweep of a single band.

The SWEEP TIME switch in conjunction with the SWEEP TIME MULTIPLIER control sets the sweep time per band block. The 0.1 second and 1.0 second positions are utilized only when an oscilloscope is being used and automatically inhibit the X-Y recorder outputs in these two positions. The SWEEP TIME MULTIPLIER control enables the operator to vary the sweep time from 10 seconds up to 1000 seconds.

The SCAN MODE switch of the ESC-125C determines whether a scan routine is repetitive or stops after a single run. In the MULTI-SCAN position, the ESC-125C Programmer repeats the programmed routine until either the STOP or RESET switch is pushed. In the SINGLE-SCAN position, the ESC-125C Programmer scans through the routine once and at the end of the routine automatically goes to the RESET MODE.

To initiate a selected scan routine, the ESC-125C START switch is pushed. The STEP switch is used to sequentially advance the program routine one band at a time.

NOTE: If the STEP switch is held down, the programmer routine will continue to advance until either the end of the routine is reached (single scan) or the STEP switch is released.

When advanced to the next band, the programmer will automatically start the sweep at the beginning of the band. As each

band is being scanned in turn, the band light located over each BAND/FREQUENCY SELECT switch will be activated for that band.

To halt the programmer routine at any point in the scan, the ESC-125C STOP switch is pushed. If held depressed, the scan will backup until released. The scan routine can be restored at any point by pushing the START switch again. When the scan routine must be restarted at the lowest frequency band selected, push the RESET and then the START switch.

For information concerning the operation and uses of the Model EMC-25 and/or Model EMC-10 Interference Analyzers, see the respective instruction manuals for each unit.

3.6.3 ESC-125C/OSCILLOSCOPE OPERATION

This section refers to the operation of an ESC-125C Programmer utilizing a conventional oscilloscope for spectrum analyzer CRT displays of the data obtained from the analyzers.

3.6.3.1 Refer to Figure 3-3 (ESC-125C INTERCONNECTION DIAGRAM) for equipment interconnections.

3.6.3.2 OPERATION

The ESC-125C Programmer has the capability and provision for using an external oscilloscope as a spectrum analyzer over any of the octave bands of the EMC-25.

The oscilloscope is set for operation with an external horizontal input (X AMP)[see the procedure given in the oscilloscope instruction manual] with both the vertical and horizontal inputs DC coupled.

The 0.1 and 1.0 second positions of the SWEEP TIME switch

are intended specifically for use with an external oscilloscope and automatically inhibit the X-Y recorder inputs. For the majority of applications which utilizes the external oscilloscope, the SWEEP TIME switch is set to the 0.1 second position.

The 0.1 and 1.0 second positions also inhibit the end of band sweep step command and thus the ESC-125C STEP switch must be used to advance each band in order.

NOTE: For those applications where both the external oscilloscope and X-Y recorder are connected to the ESC-125C:

a. In the 0.1 or 1.0 second positions of the SWEEP TIME switch the X-Y recorder pens will go to the upper right hand corner of the plotter and remain there.

b. In the 10 or 100 second positions of the SWEEP TIME switch the X-Y recorder will operate as described in paragraph 3.6.2.4.

The EMC-25 DETECTION switch is placed to the SLIDEBACK position with the SLIDEBACK THRESHOLD control full CCW to start. The ESC-125C MODE switch is placed to the SPECTRUM position to start.

The scan routine is initiated by first pushing the RESET and then the START switch of the ESC-125C. A display will appear on the CRT of the oscilloscope equivalent to the entire EMC-25 band being scanned. Use the ESC-125C STEP switch to advance the EMC-25 to the bands desired.

The amplitude of signals appearing on the CRT display can be determined by utilizing the EMC-25 SLIDEBACK THRESHOLD control in conjunction with the EMC-25 ATTENUATOR and front panel meter.

A reference point is first established on the CRT display by adjusting the oscilloscope vertical control (X) to position the scope trace to the point desired. This point is established with the EMC-25 SLIDEBACK THRESHOLD control set full CCW and the EMC-25 front panel meter reading -40dB.

NOTE: To facilitate making this adjustment, remove the RF input from the EMC-25.

Next increase the EMC-25 SLIDEBACK THRESHOLD control in a CW direction (the trace line will move up the CRT display) until the trace line intersects the peak of the signal that is being measured. The EMC-25 meter reading also increases as the THRESHOLD control is increased CW and by taking this reading, adding it to the EMC-25 ATTENUATOR setting produces the amplitude level of the signal in question.

The frequency of signals appearing on the CRT display is determined by utilizing the MARKER signal produced by the ESC-125C. When activated a blip appears on the CRT display which in the SPECTRUM position of the MODE switch corresponds to the EMC-25 tuning control cursor. To determine the frequency of a signal being measured, use the EMC-25 tuning control to position the MARKER blip at the peak of the signal in question and simply read the frequency dial of the EMC-25.

If the operator desires to evaluate a selected position of the CRT display, the SECTOR position of the MODE switch is utilized. First the MARKER signal is position over the section of the display selected, next the MODE switch is changed to

the SECTOR position. In the SECTOR position, the MARKER signal occupies a fixed position in the center of the CRT display and the DISPERSION control is activated. Now the sweep is centered around the signal and the DISPERSION control sets the sweep width around the signal. With the DISPERSION control set to min mum, the CRT display equals the CRT display in SPECTRUM. As the control is increased towards maximum, the display coverage will decrease until the section centered around the MARKER signal will be expanded to cover the entire CRT display.

3.6.4 ESC-125C/EMC-10 OPERATIONS

In the operating procedures described above, the descriptions given center on the EMC-25 and its role and function in the ESC-125C/X-Y RECORDER and ESC-125C/OSCILLOSCOPE operations. Since the ESC-125C Programmer was desibned to utilize the band and state codes from the EMC-25 Analyzer, it must always be operated with an EMC-25.

The EMC-25 frequency coverage is from 10kHz to 1000MHz, the EMC-10 Analyzer is used to extend the coverage down to 20Hz. Depending upon the particular EMC/RFI specifications tests are being conducted to, the EMC-10 coverage could vary from 20Hz to 10Hz up to 20Hz to 50kHz. The procedure for adjustment of the upper limit is EMC-10 frequency coverage is described in paragraph 3.5.1.3.

The following two sections give a brief description of ESC-125C/EMC-10 operations.

3.6.4.1 ESC-125C/EMC-10/X-Y RECORDER OPERATION

The operation of an ESC-125C/EMC-10 with an X-Y recorder is essentially the same as that descri ed in paragraph 3.6.2 except for the differences listed below.

a) Whenever the EMC-10 BANDWIDTH SELECTOR is set to the 250, 50, or 5Hz bandwidth positions, the ESC-125 sweep time must be increased proportionally. As the bandwidth becomes narrower, the sweep time increases in duration.

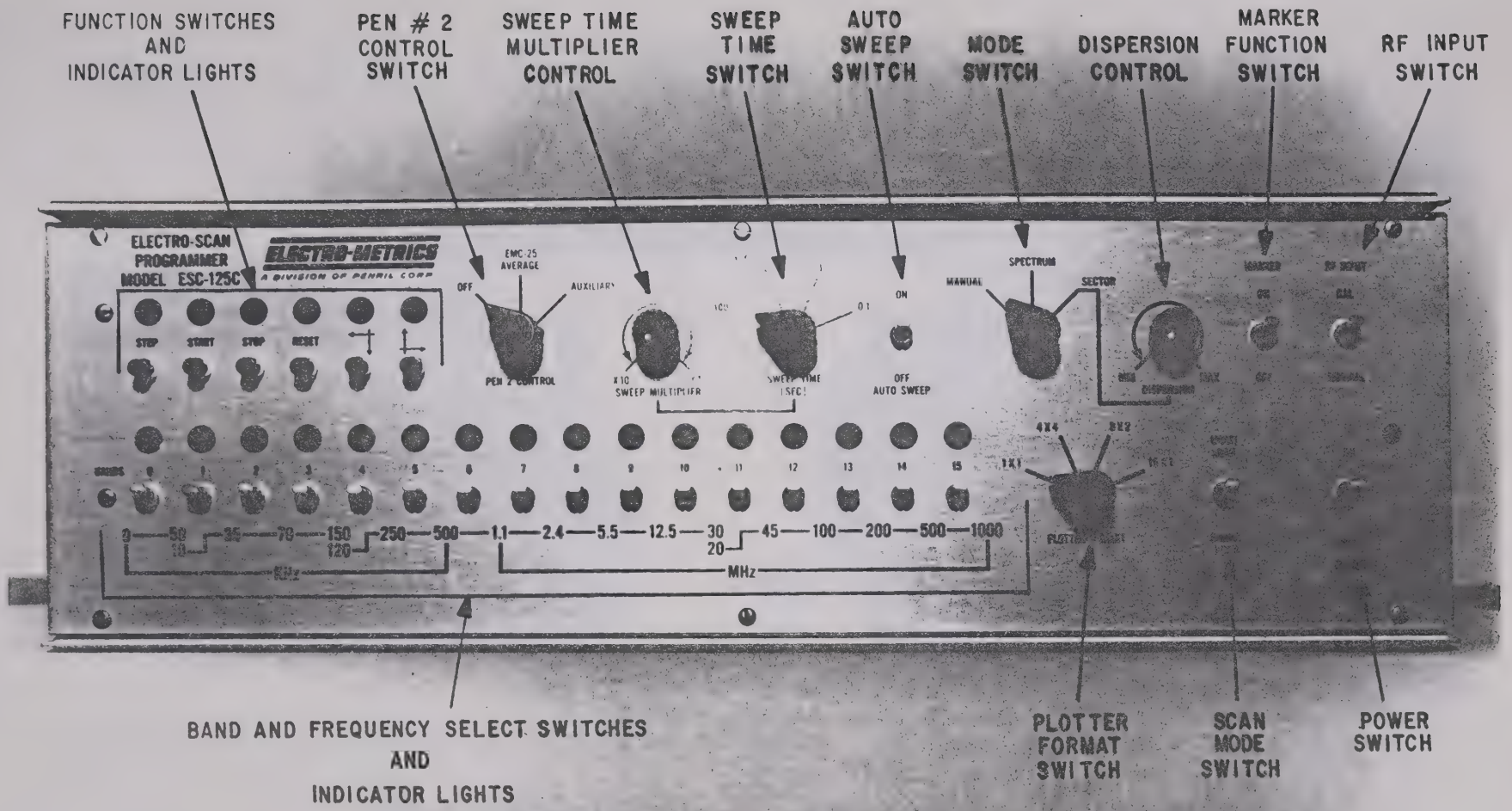
b) The dual pen functions of the ESC-125C are not operatable when using the EMC-10.

c) The AUTO SWEEP circuit is not operate when using the EMC-10.

3.6.4.2 ESC-125C/EMC-10/OSCILLOSCOPE OPERATION

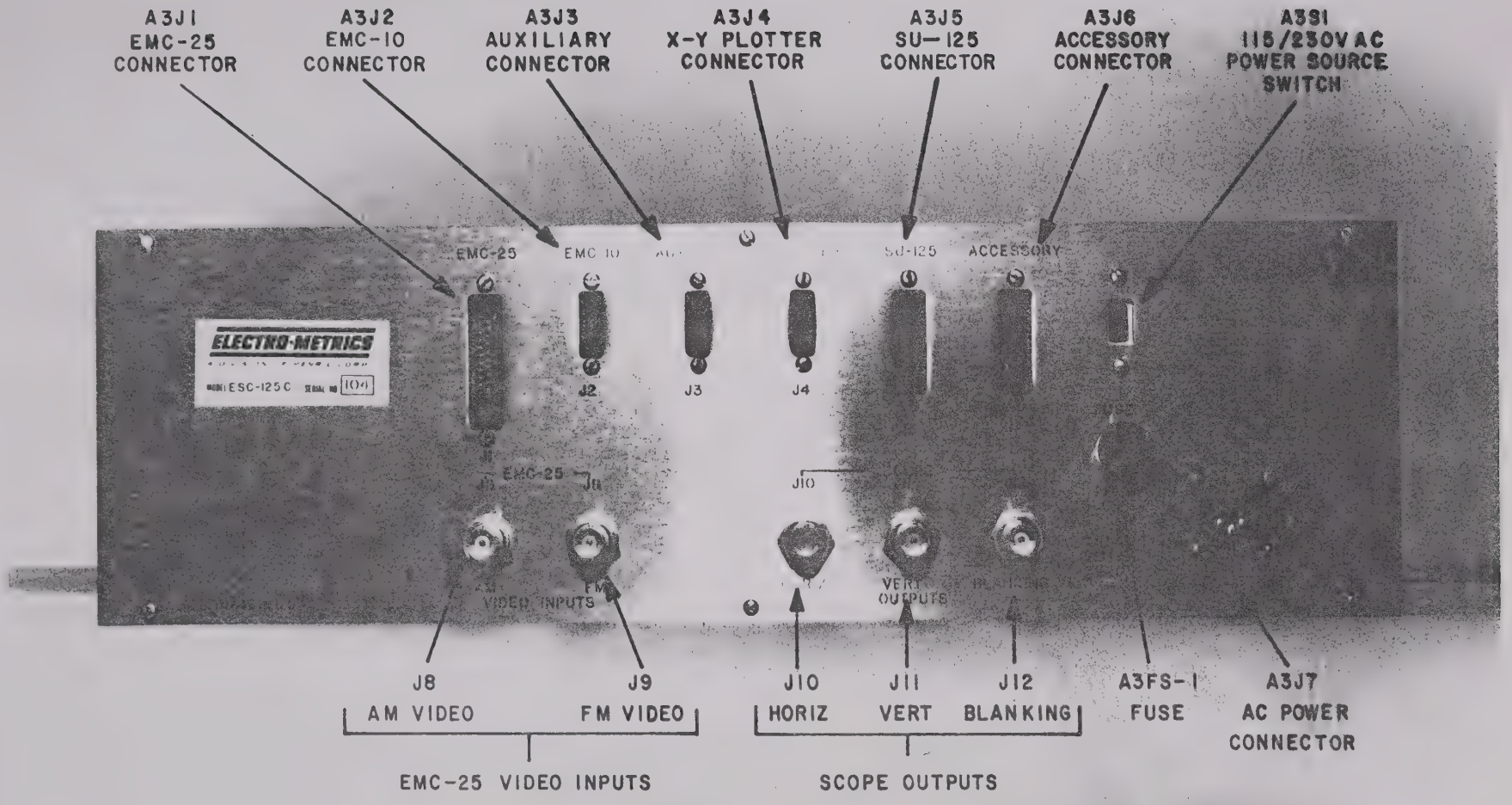
It is possible to utilize the ESC-125C/EMC-10 combination in conjunction with external oscilloscope for the purpose of data display. However, because of the need for relatively slow scan speeds in order to gain useful information from the display it is more convenient and quicker to use an X-Y recorder.

3.5.5 Any questions which may arise concerning the operation or utilization of the ESC-125C Programmer with the EMC-25, EMC-10, or other ELECTRO-METRICS equipment should be directed to the nearest ELECTRO-METRICS representative or the ELECTRO-METRICS Customer Service Department.



ESC-125C FRONT PANEL

FIGURE 3-1



ESC-125C REAR PANEL

FIGURE 3-2

LATEST

REVISIONS

SYM	DESCRIPTION	BY	DATE	APPROVED

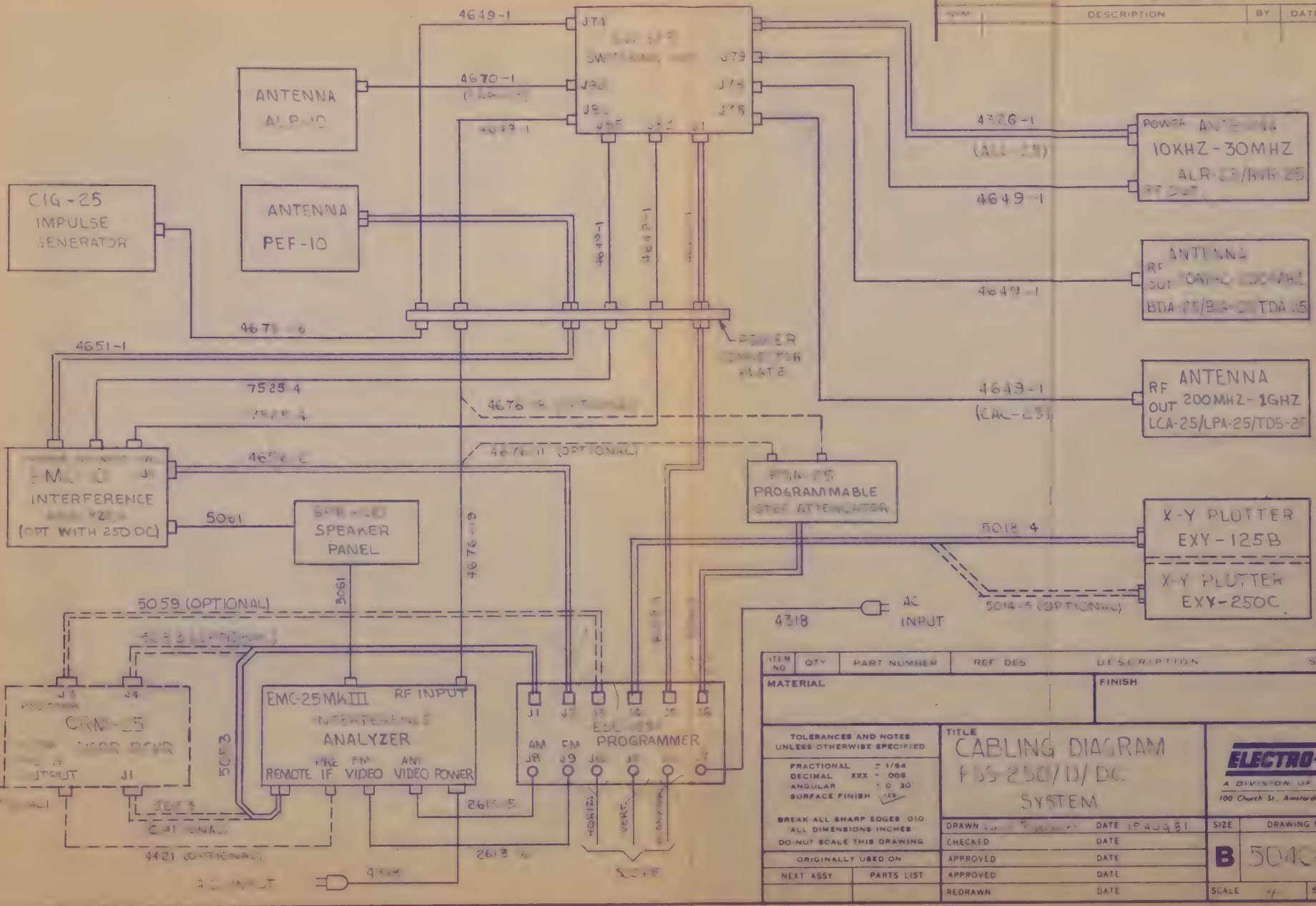


FIG 3-

ITEM NO	QTY	PART NUMBER	REF DES	DESCRIPTION	SOURCE

MATERIAL

FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL XXX ± 005
ANGULAR ± 0 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON

NEXT ASSY | PARTS LIST

TITLE
CABLING DIAGRAM
FIG-250/D/DC
SYSTEM

DRAWN	DATE 15 AUG 81	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

ELECTRO-METRICS
A DIVISION OF [illegible]
100 Church St. Amsterdam New York 12010

SIZE	DRAWING NUMBER	ISSUE
B	5040-7	

SCALE 1/4 SHEET OF

ESC-125C TOP VIEW

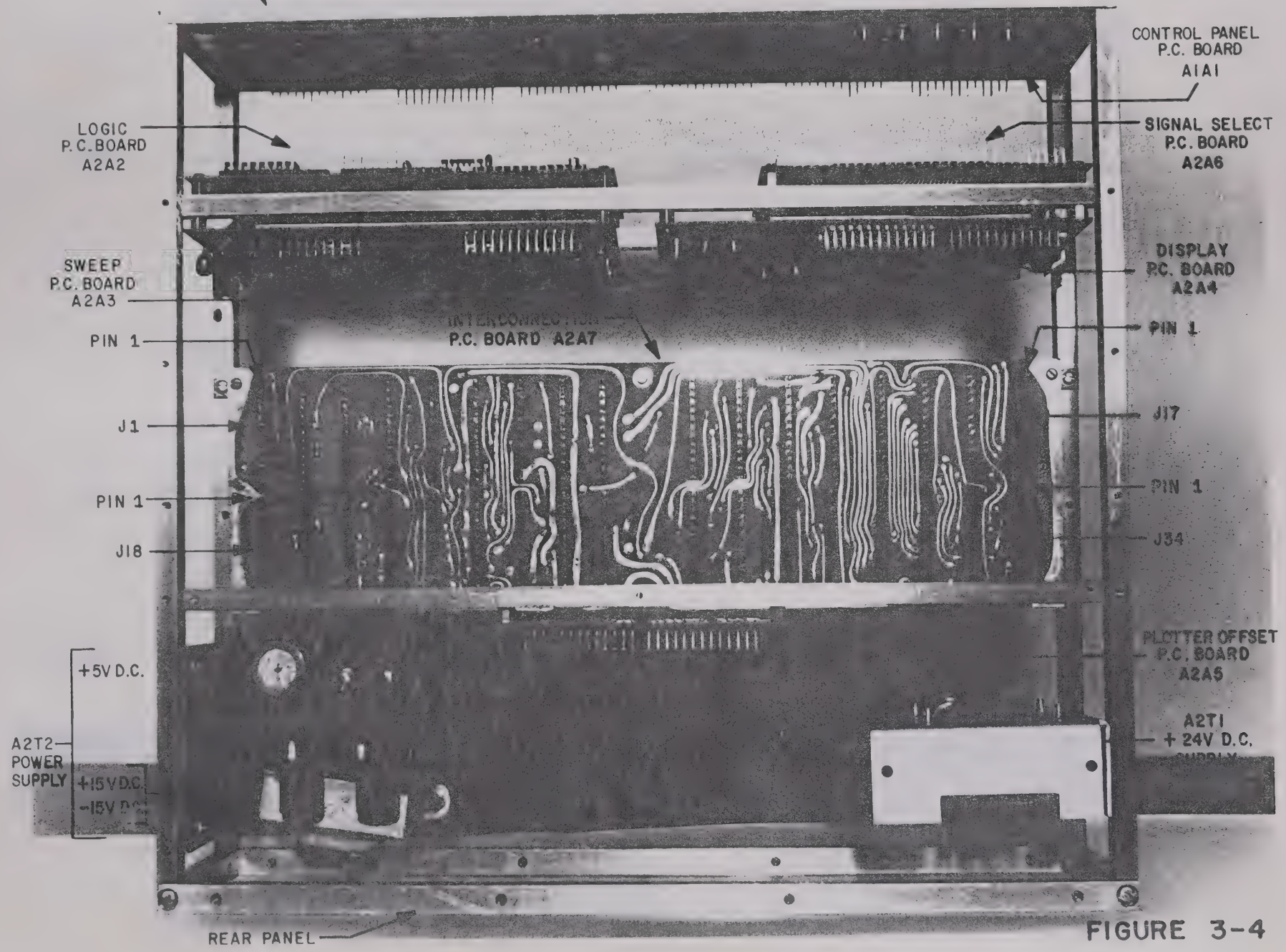


FIGURE 3-4

ESC-125C BOTTOM VIEW

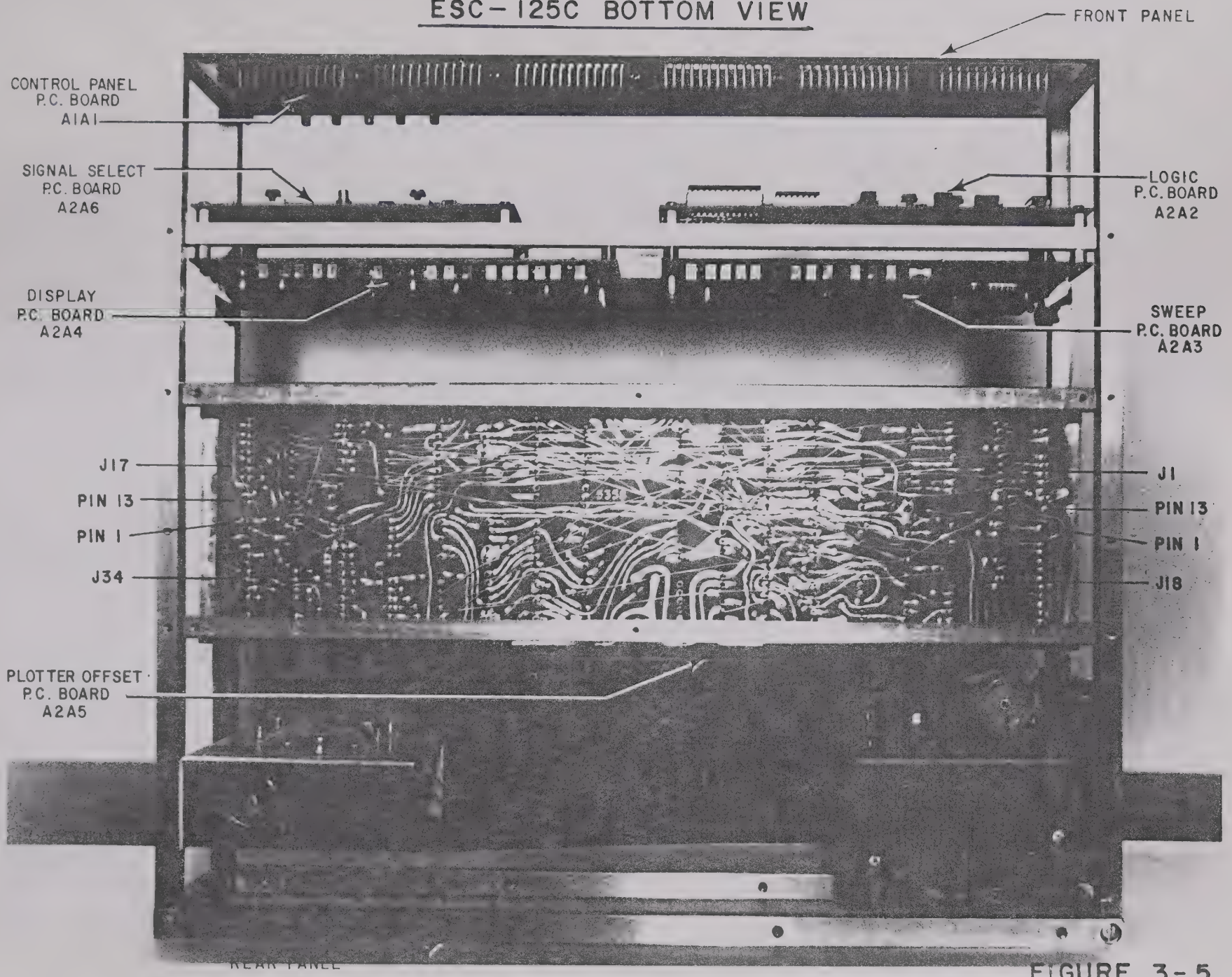
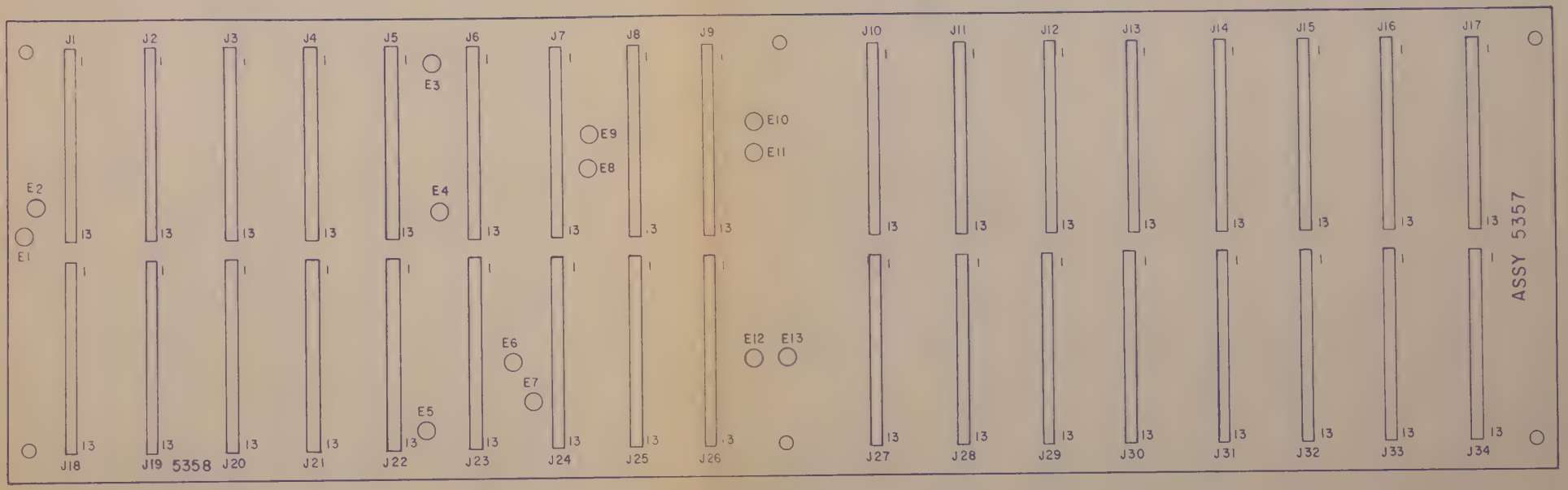
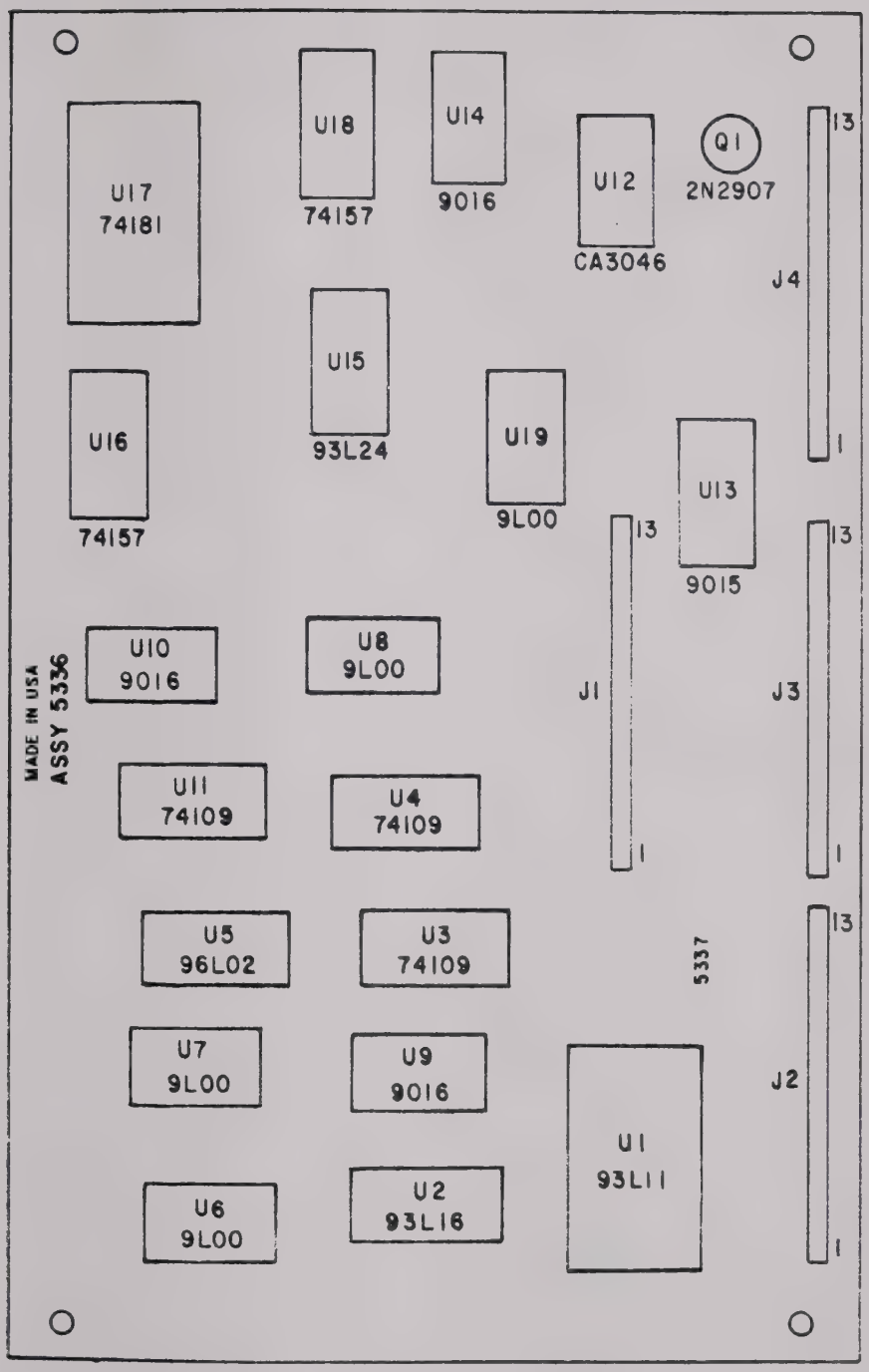


FIGURE 3-5



INNERCONNECTION PC BOARD
A2A7 ESC-125C

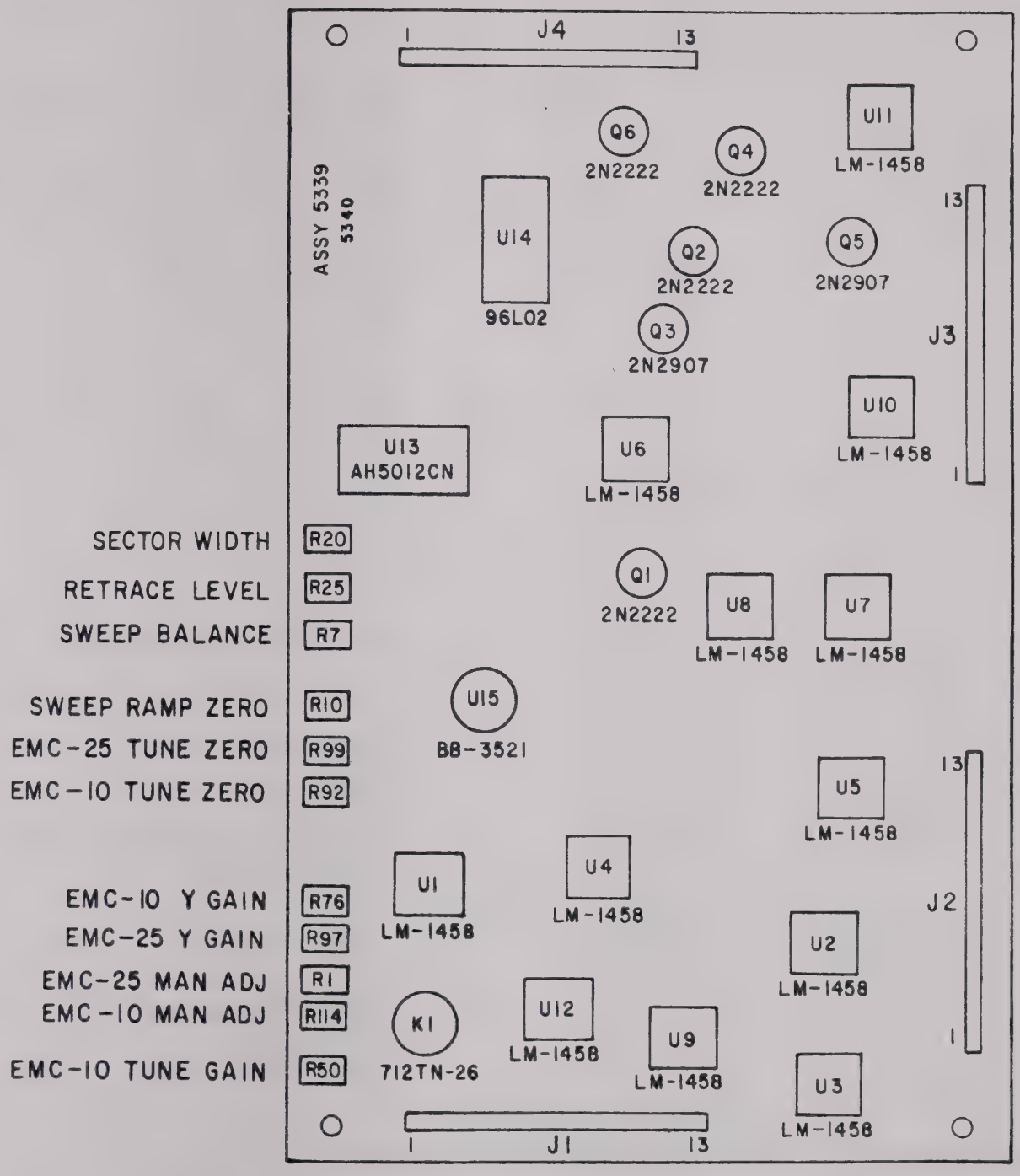
FIGURE 3-6



LOGIC CONTROL PC BOARD

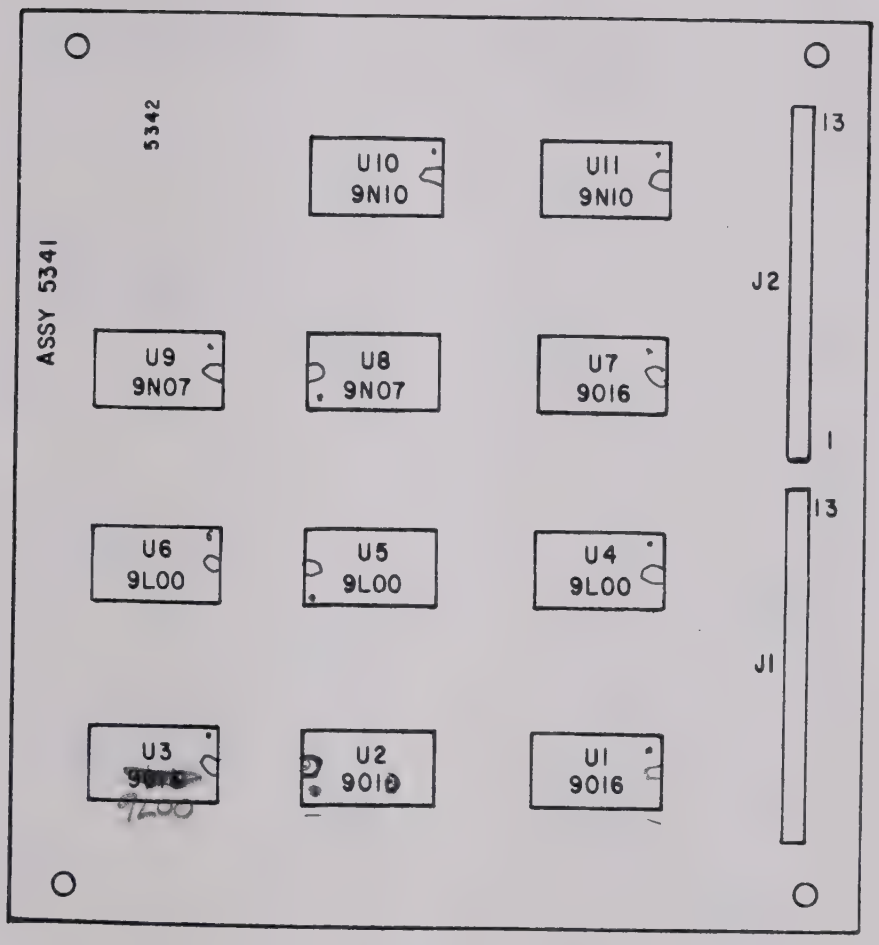
A2A2 ESC-125C

FIGURE 3-7



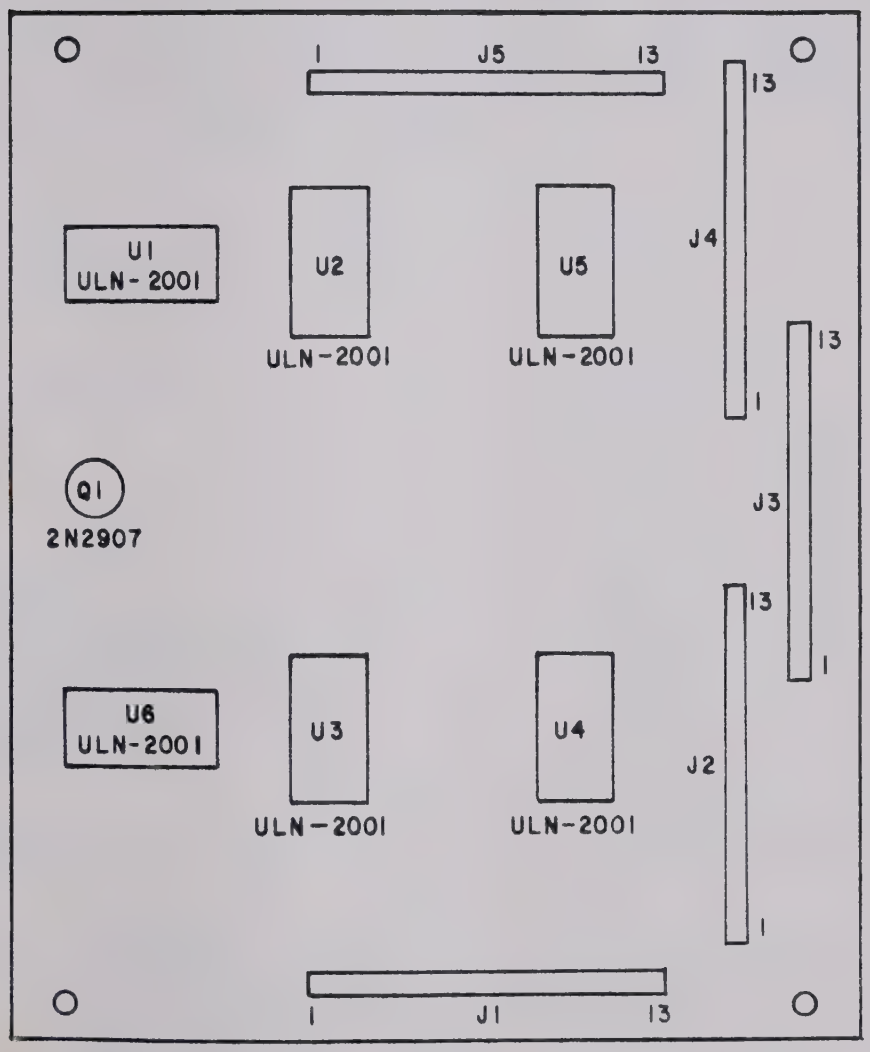
SWEEP PC BOARD
A2A3 ESC-125C

FIGURE 3-8



PLOTTER OFFSET PC BOARD
A2A5 ESC-125C

FIGURE 3-10



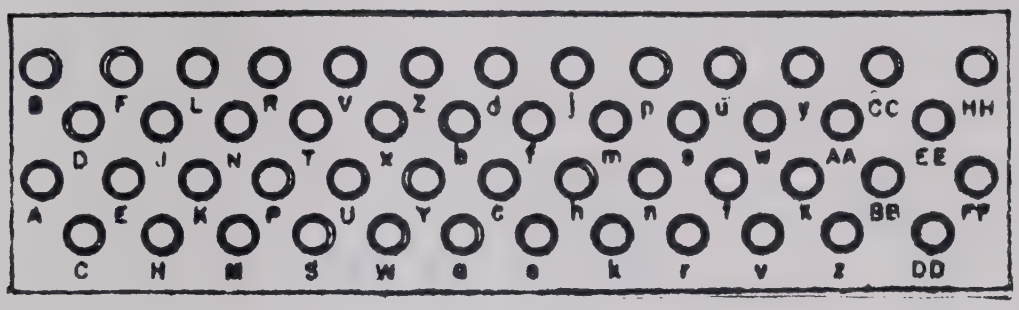
SIGNAL SELECT PC BOARD

A2A6 ESC-125C

FIGURE 3-11

FIGURE 3-12

EMC-25 CONNECTOR (J1)



A	TUNE VOLTAGE IN (EMC-25 POT ARM)	a	SPARE
B	SPARE	b	EMC-25 +Y IN
C	TUNING VOLTAGE OUT (TO EMC-25)	c	SPARE
D	SPARE	d	SPARE
E	SPARE	e	BAND STEP↑
F	ANTENNA INHIBIT	f	SPARE
H	SPARE	h	BAND LOGIC COMMAND
J	TUNE GND	j	SPARE
K	SPARE	k	0-1 BAND LOGIC
L	SPARE	m	SPARE
M	SPARE	n	0-2 BAND LOGIC
N	SPARE	p	SPARE
P	GAIN CONTROL	r	0-4 BAND LOGIC
R	IG COMMAND (-6VDC ACTIVATE)	s	SPARE
S	BANDWIDTH COMMAND	t	0-8 BAND LOGIC
T	DWELL COMMAND (TO EMC-25)	u	SPARE
U	BANDWIDTH SELECT	v	SPARE
V	+12VDC INPUT	w	SPARE
W	SPARE	x	IG CONTACTS
X	SPARE	y	SPARE
Y	BAND STEP↓	z	IG LEVEL IN
Z	SPARE		

AA	GND
BB	SHUNT CAL COMMAND (-12VDC ACTIVATE)
CC	-RAW IN (-7 to -15VDC)
DD	SPARE
EE	SPARE
FF	SPARE
HH	+RAW IN (+15 to +24VDC)

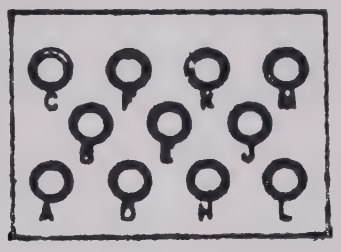
FIGURE 3-13

EMC-10 CONNECTOR (J2)

A	TUNING VOLTAGE OUT (TO EMC-10)
B	TUNE VOLTAGE IN (EMC-10 POT ARM)
C	SPARE
D	EMC-10 Y GND
E	SPARE
F	SPARE
H	SPARE
J	SPARE
K	GND
L	SPARE
M	EMC-10 +Y IN

FIGURE 3-14

AUXILIARY CONNECTOR (J3)



A	SPARE
B	SPARE
C	SPARE
D	SPARE
E	GND
F	$-Y_1$
H	$+Y_2$
J	$-Y_2$
K	SPARE
L	SPARE
M	$+Y_1$

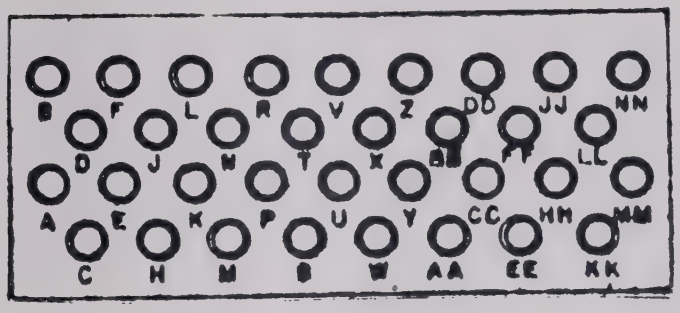
FIGURE 3-15

PLOTTER CONNECTOR (J4)

A	PEN DROP RETURN
B	+X
C	GND
D	PEN DROP
E	-X
F	$-Y_1$
H	$+Y_2$
J	$-Y_2$
K	SPARE
L	SPARE
M	$+Y_1$

FIGURE 3-16

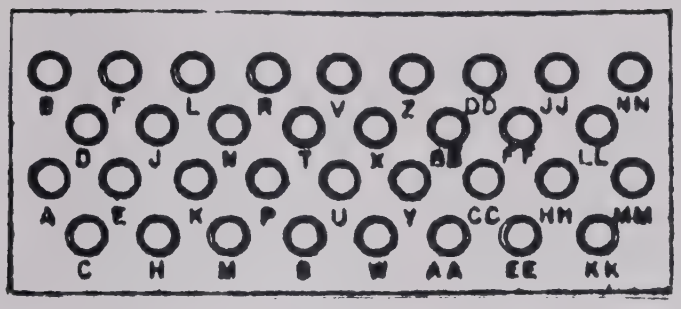
SU-125 CONNECTOR (J5)



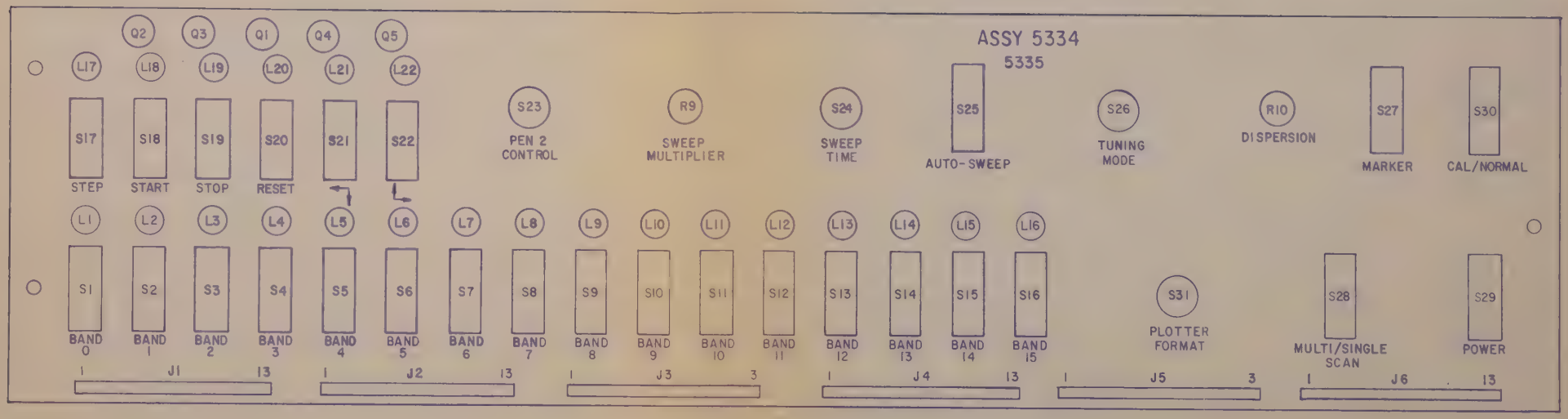
A	STATE S0		AA	STATE S14	
B	SPARE		BB	SPARE	
C	STATE S1		CC	GND	
D	SPARE		DD	ANTENNA INHIBIT	
E	08 BAND CODE		EE	STATE S15	
F	02 BAND CODE		FF	GND	
H	01 BAND CODE		HH	SPARE	
J	04 BAND CODE		JJ	+24VDC OUT	
K	STATE S2		KK	+RAW (+15 to +24VDC)	OUT
L	STATE S3		LL	+RAW	OUT
M	+24V OUT		MM	-RAW (-7 to -15VDC)	OUT
N	STATE S4		NN	-RAW	OUT
P	STATE S5				
R	STATE S6				
S	STATE S7				
T	STATE S8				
U	STATE S9				
V	STATE S10				
W	STATE S11				
X	CAL COMMAND				
Y	STATE S12				
Z	STATE S13				

FIGURE 3-17

ACCESSORY CONNECTOR (J6)



A	STATE S1	AA	SPARE
B	STATE S2	BB	SPARE
C	STATE S0	CC	STATE S13
D	01 BAND CODE	DD	STATE S14
E	STATE S3	EE	SPARE
F	STATE S4	FF	SPARE
H	02 BAND CODE	HH	STATE S15
J	04 BAND CODE	JJ	GND
K	STATE S5	KK	SPARE
L	STATE S6	LL	SPARE
M	08 BAND CODE	MM	SHIELD GND
N	+24VDC OUT	NN	SPARE
P	STATE S7		
R	STATE S8		
S	+15VDC OUT		
T	-15VDC OUT		
U	STATE S9		
V	STATE S10		
W	+5VDC OUT		
X	SPARE		
Y	STATE S11		
Z	STATE S12		



CONTROL PANEL PC BOARD
AIAI ESC-125C

FIGURE 3-18

Section IV

Service and Maintenance

4.1 General

This section provides the information necessary for the proper maintenance, calibration, and repair of the ESC-125C Programmer. Failure to follow these procedures could violate the terms of the manufacturer's warranty, plus compromise the reliability, operation, and integrity of the instrument.

4.2 Instrument Access

To gain complete access to the interior of the instrument, the top and bottom covers must be removed. Each cover is held in place by four screws in the rear of each cover. Remove the screws and slide each cover back and out of the slots holding the cover in place.

4.3 Printed Circuit Board Maintenance

4.3.1 GENERAL. The majority of electronic circuitry employed by the ESC-125C Programmer is distributed between five principal PC boards (A2A2 Logic, A2A3 Sweep, A2A4 Display, A2A5 PLOTTER OFFSET, A2A6 SIGNAL SELECT). The boards are fasten to standoffs located on the lateral bars which are part of the unit s framework. To integrate the PC boards into the circuitry of the ESC 125C, each PC board utilizes two or more 13 pin male headers, each of which mates to a corresponding 13 pin female connector. The female connectors are part of a wiring harness network which utilizes an interconnection band for unit circuitry interfacing and integration.

4.3.2 REMOVAL AND REPLACEMENT.

4.3.2.1 REMOVAL. The following procedure is utilized when removing a PC board from the ESC-125C Programmer.

"CAUTION"

Do not remove printed circuit boards while power is applied to the ESC-125C. The power should be turned off and all external power removed. Failure to do so could cause extensive damage to the IC and semi-conductor components on the boards.

a) Remove the four screws (one in each corner) that secure the board to the standoffs.

b) Carefully lift the board far enough out of the unit to allow the connectors to be removed. (The wiring harness has enough slack in it for this purpose).

c) To facilitate connector removal, use a wide tip screwdriver to gently pry up first one then the other end of the connector. This should loosen the connector enough to allow it to be removed by hand using a gentle rocking motion.

d) The PC board is now free from the unit.

4.3.2.2 REPLACEMENT. To replace a PC board, follow the procedure given in paragraph 4.3.2.1 in reverse order. Use the following information to facilitate board replacement.

a) For correct placement and orientation of the various PC board connectors see the following figures:

1. Figure 3-7 Logic board A2A2
2. Figure 3-8 Sweep board A2A3
3. Figure 3-9 Display board A2A4

4. Figure 3-10 PLOTTER OFFSET board A2A5

5. Figure 3-11 SIGNAL SELECT board A2A6

b) Use a firm but gentle downward pressure to mate the connector to the header.

4.3.2.3 PRINTED CIRCUIT BOARD PRECAUTIONS.

a) Never touch the printed surface with bare fingers; skin oils can create leakage paths.

b) Use a grounded soldering iron to avoid destruction of IC's and semi-conductors.

c) Avoid excessive heat when repairing a board.

d) After repair, clean the printed surface of all contaminants, excess solder, and resin using a freon-base cleaner. Be sure that excess solder has not created new circuit paths.

4.3.2.4 PC BOARD TESTING PROCEDURE. To facilitate the troubleshooting, testing, and alignment of a particular PC board, the following procedure is followed:

a) Using the procedure given in paragraph 4.3.2.1 as a guide, remove the four screws securing the board to the standoffs.

b) Lift the board out of the unit and position the bottom edge so that the two screw holes align themselves with the standoffs on the top lateral bar.

c) Secure the board to the top lateral bar using two screws. The board is now positioned above the unit, secured and allowing easy access for troubleshooting, test point

checks, and parameter alignments.

4.4 Troubleshooting

The procedure for troubleshooting the ESC-125C is similar to that employed for other electronic devices. This consist of pin pointing the source/cause of malfunction by the process of logically eliminating alternate possibilities. By eliminating the greatest number of possibilities with one check, will quickly narrow the remaining choices until the defective component or circuitry is isolated.

To facilitate troubleshooting the ESC-125C, the procedures of paragraph 3.5.2 can be utilized as a guide. Use the check points and voltages listed to aid in isolating and determining the area of circuit malfunctioning. For any additional help contact the ELECTRO-METRICS CUSTOMER SERVICE DEPARTMENT.

Section VI

Miscellaneous Information

6.1 General

This section contains a point to point listing of the 34 connector located on the A2A7 Interconnection board.

SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C

WIRE CONNECTION LIST

A2A7

FIGURE 6-1

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES
UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON

NEXT ASSY.	PARTS LIST

TITLE

ESC-125C
A2A7 INNERCONNECTION BOARD
POINT TO POINT LISTING

DRAWN	DATE
CHECKED	DATE
APPROVED	DATE
APPROVED	DATE
REDRAWN	DATE

ELECTRO-METRICS
A DIVISION OF PENRIL CORP.
100 Church St., Amsterdam, New York 12010

SIZE	DRAWING NUMBER	ISSUE
A	5369	

SCALE: SHEET OF

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J1 - 1		J2 - 1				PC Bd.	$\overline{S}o$ UNBUFFERED	
2	J1 - 2		-					SPARE	
3	J1 - 3		J2 - 3				PC Bd.	$\overline{S}_1$ UNBUFFERED	
4	J1 - 4		J2 - 4				PC Bd.	$\overline{S}_3$ UNBUFFERED	
5	J1 - 5		J2 - 5				PC Bd.	$\overline{S}_2$ UNBUFFERED	
6	J1 - 6		-					SPARE	
7	J1 - 7		J2 - 7				PC Bd.	$\overline{S}_4$ UNBUFFERED	
8	J1 - 8		J2 - 8				PC Bd.	$\overline{S}_5$ UNBUFFERED	
9	J1 - 9		J2 - 9				PC Bd.	$\overline{S}_6$ UNBUFFERED	
10	J1 - 10		J2 - 10				PC Bd.	$\overline{S}_7$ UNBUFFERED	
11	J1 - 11		+5V BUSS				PC Bd.	+5V DC	
12	J1 - 12		+5V BUSS				PC Bd.	+5V DC	
13	J1 - 13		-					SPARE	
14									
15	J2 - 1		J1 - 1				PC Bd.	REPEAT	
16	J2 - 1		J13 - 6				PC Bd.	$\overline{S}o$ UNBUFFERED	
17	J2 - 2		J25 - 12				PC Bd.	LOWER LEFT SWITCH	
18	J2 - 3		J1 - 3				PC Bd.	REPEAT	
19	J2 - 3		J13 - 5				PC Bd.	$\overline{S}_1$ UNBUFFERED	
20	J2 - 4		J1 - 4				PC Bd.	REPEAT	
21	J2 - 4		J16 - 6		Yellow		Wire Wrap	$\overline{S}_3$ UNBUFFERED	
22	J2 - 5		J1 - 5				PC Bd.	REPEAT	

PROJECT ESC-125C A2A7 INTERCONNECTION BOARD	SHEET 1 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J2 - 5		J16 - 5		Yellow		Wire Wrap	$\overline{S}_2$ UNBUFFERED	
2	J2 - 6		J5 - 13				PC Bd.	UPPER RIGHT SWITCH	
3	J2 - 6		J25 - 13				PC Bd.	UPPER RIGHT SWITCH	
4	J2 - 7		J1 - 7				PC Bd.	REPEAT	
5	J2 - 7		J16 - 7		Yellow		Wire Wrap	$\overline{S}_4$ UNBUFFERED	
6	J2 - 8		J1 - 8				PC Bd.	REPEAT	
7	J2 - 8		J16 - 8		Yellow		Wire Wrap	$\overline{S}_5$ UNBUFFERED	
8	J2 - 9		J1 - 9				PC Bd.	REPEAT	
9	J2 - 9		J16 - 9		Yellow		Wire Wrap	$\overline{S}_6$ UNBUFFERED	
10	J2 - 10		J1 - 10				PC Bd.	REPEAT	
11	J2 - 10		J16 - 10		Yellow		Wire Wrap	$\overline{S}_7$ UNBUFFERED	
12	J2 - 11		+5V BUSS				PC Bd.	+5V DC	
13	J2 - 12		+5V BUSS				PC Bd.	+5V DC	
14	J2 - 13		J25 - 11				PC Bd.	PLOTTER INHIBIT (RESET LOGIC)	
15									
16	J3 - 1		J4 - 1				PC Bd.	$\overline{S}_8$ UNBUFFERED	
17	J3 - 2		J4 - 2				PC Bd.	$\overline{S}_9$ UNBUFFERED	
18	J3 - 3		J4 - 3				PC Bd.	$\overline{S}_{10}$ UNBUFFERED	
19	J3 - 4		J4 - 4				PC Bd.	$\overline{S}_{11}$ UNBUFFERED	
20	J3 - 5		J4 - 5				PC Bd.	$\overline{S}_{12}$ UNBUFFERED	
21	J3 - 6		J4 - 6				PC Bd.	FRONT PANEL DIODES (ANODE)	
22	J3 - 7		-					SPARE	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J3 - 8		J4 - 8				PC Bd	$\overline{S}_{13}$ UNBUFFERED	
2	J3 - 9		-					SPARE	
3	J3 - 10		J4 - 10				PC Bd	$\overline{S}_{14}$ UNBUFFERED	
4	J3 - 11		J4 - 11				PC Bd	$\overline{S}_{15}$ UNBUFFERED	
5	J3 - 12		-					SPARE	
6	J3 - 13		-					SPARE	
7									
8	J4 - 1		J3 - 1				PC Bd	REPEAT	
9	J4 - 1		J16 - 11		Yellow		Wire Wrap	$\overline{S}_{8}$ UNBUFFERED	
10	J4 - 2		J3 - 2				PC Bd	REPEAT	
11	J4 - 2		J14 - 5		Yellow		Wire Wrap	$\overline{S}_{9}$ UNBUFFERED	
12	J4 - 3		J3 - 3				PC Bd	REPEAT	
13	J4 - 3		J14 - 6		Yellow		Wire Wrap	$\overline{S}_{10}$ UNBUFFERED	
14	J4 - 4		J3 - 4				PC Bd	REPEAT	
15	J4 - 4		J14 - 7				PC Bd	$\overline{S}_{11}$ UNBUFFERED	
16	J4 - 5		J3 - 5				PC Bd	REPEAT	
17	J4 - 5		J14 - 8		Yellow		Wire Wrap	$\overline{S}_{12}$ UNBUFFERED	
18	J4 - 6		J3 - 6				PC Bd	REPEAT	
19	J4 - 7		J7 - 5				PC Bd	M.S./S. SCAN SW (N.O.)	
20	J4 - 8		J3 - 8				PC Bd	REPEAT	
21	J4 - 8		J14 - 9		Yellow		Wire Wrap	$\overline{S}_{13}$ UNBUFFERED	
22	J4 - 9		J13 - 7				PC Bd	RESET/HOLD LOGIC	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J4 - 10		J3 - 10				PC BD	REPEAT	
2	J4 - 10		J14 - 10		Yellow		Wire Wrap	$\overline{S}_{14}$ UNBUFFERED	
3	J4 - 11		J3 - 11				PC BD	REPEAT	
4	J4 - 11		J14 - 11		Yellow		Wire Wrap	$\overline{S}_{15}$ UNBUFFERED	
5	J4 - 12		GND BUSS				PC BD	GND	
6	J4 - 13		GND BUSS				PC BD	GND	
7									
8	J5 - 1		-					SPARE	
9	J5 - 2		J30 - 8		Yellow		Wire Wrap	PEN #2 CONTROL SW. (AUX)	
10	J5 - 3		J30 - 9		Yellow		Wire Wrap	PEN #2 CONTROL SW. (AVE.)	
11	J5 - 4		J30 - 10		Yellow		Wire Wrap	PEN #2 CONTROL SW. (OFF)	
12	J5 - 5		J6 - 3				PC BD	SWP. TIME POT (C.W.)	
13	J5 - 6		-					SPARE	
14	J5 - 7		J24 - 2				PC BD	SWP. TIME POT (ARM)	
15	J5 - 8		-					SPARE	
16	J5 - 9		J24 - 7				PC BD	SWP. TIME LOGIC (100)	
17	J5 - 10		J24 - 3				PC BD	SWP. TIME LOGIC (10)	
18	J5 - 11		J24 - 6				PC BD	SWP. TIME LOGIC (1)	
19	J5 - 12		J24 - 4				PC BD	SWP. TIME LOGIC (0.1)	
20	J5 - 13		J2 - 6				PC BD	REPEAT	
21									
22									

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 4 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J6 - 1		GND BUSS				PC BD	GND	
2	J6 - 2		TERMINAL E3				PC BD	FM VIDEO INPUT	
3	J6 - 3		J5 - 5				PC BD	REPEAT	
4	J6 - 4		-					SPARE	
5	J6 - 5		-					SPARE	
6	J6 - 6		-					SPARE	
7	J6 - 7		-					SPARE	
8	J6 - 8		-					SPARE	
9	J6 - 9		J19 - 7				PC BD	STOP SWITCH	
10	J6 - 10		-					SPARE	
11	J6 - 11		TERMINAL E4				PC BD	AM VIDEO INPUT	
12	J6 - 12		GND BUSS				PC BD	GND	
13	J6 - 13		GND BUSS				PC BD	GND	
14									
15	J7 - 1		J23 - 10				PC BD	MARKER SWITCH (COMM.)	
16	J7 - 2		J23 - 6		Yellow		Wire Wrap	MARKER SWITCH (N.O.)	
17	J7 - 3		J21 - 8				PC BD	DISPERSION POT (ARM)	
18	J7 - 4		J21 - 12				PC BD	DISPERSION POT (CW)	
19	J7 - 5		J4 - 7				PC BD	REPEAT	
20	J7 - 6		J19 - 2					M.S./S.SCAN SWITCH (COMM.)	
21	J7 - 7		+24V BUSS					+24V DC	
22	J7 - 8		-					SPARE	

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 5 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J7 - 9		J31 - 12				PC BD	RF INPUT SWITCH (COMM.)	
2	J7 - 10		-					SPARE	
3	J7 - 11		-					SPARE	
4	J7 - 12		GND BUSS				PC BD	GND	
5	J7 - 13		GND BUSS				PC BD	GND	
6									
7	J8 - 1		J23 - 2				PC BD	EMC-25 TUNING VOLTAGE IN	
8	J8 - 2		J21 - 3		Yellow		Wire Wrap	TUNE VOLTAGE OUT TO EMC-25	
9	J8 - 3		J21 - 4		Yellow		Wire Wrap	EMC-25 TUNE GND	
10	J8 - 4		J9 - 5				PC BD	+12V DC TO EMC-25 GAIN CONT.	
11	J8 - 5		J9 - 11				PC BD	B.W. COMMAND TO B.W. SELECT	
12	J8 - 6		J22 - 2		Yellow		Wire Wrap	EMC-25 STEP DOWN ↓	
13	J8 - 7		J23 - 9		Yellow		Wire Wrap	EMC-25 "Y" INPUT	
14	J8 - 8		J22 - 3		Yellow		Wire Wrap	EMC-25 STEP UP ↑	
15	J8 - 9		+5V BUSS				PC BD	+5V DC	
16	J8 - 10		J22 - 8		Yellow		Wire Wrap	EMC-25 BAND CODE "1"	
17	J8 - 11		J22 - 9		Yellow		Wire Wrap	EMC-25 BAND CODE "2"	
18	J8 - 12		J22 - 12		Yellow		Wire Wrap	EMC-25 BAND CODE "4"	
19	J8 - 13		J22 - 11		Yellow		Wire Wrap	EMC-25 BAND CODE "8"	
20									
21									
22									

PROJECT	ESC-125C INTERCONNECTION BOARD	SHEET 6 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J9 - 1		J23 - 11		Yellow		Wire Wrap	EMC-25 GND	
2	J9 - 2		J31 - 13		Yellow		Wire Wrap	ANTENNA INHIBIT (TO SU125)	
3	J9 - 3		J9 - 4				PC BD	I.G. LEVEL OUT TO I.G. CONTACTS IN	
4	J9 - 4		J9 - 3				PC BD	REPEAT	
5	J9 - 5		J8 - 4				PC BD	REPEAT	
6	J9 - 6		J31 - 10				PC BD	EMC-25 +RAW (TO SU-125)	
7	J9 - 7		J31 - 11				PC BD	EMC-25 -RAW (TO SU-125)	
8	J9 - 8		-					SPARE	
9	J9 - 9		-					SPARE	
10	J9 - 10		J30 - 12		Yellow		Wire Wrap	DWELL COMMAND TO EMC-25	
11	J9 - 11		J8 - 5				PC BD	REPEAT	
12	J9 - 12		-					SPARE	
13	J9 - 13		-					SPARE	
14									
15	J10 - 1		J21 - 5		Yellow		Wire Wrap	TUNE VOLTAGE OUT TO EMC-10	
16	J10 - 2		J23 - 1				PC BD	EMC-10 TUNING VOLTAGE IN	
17	J10 - 3		J10 - 5				PC BD	EMC-10 Y GND	
18	J10 - 3		J23 - 4		Yellow		Wire Wrap	EMC-10 GND	
19	J10 - 4		J23 - 3		Yellow		Wire Wrap	EMC-10 "Y" INPUT	
20	J10 - 5		J10 - 3				PC BD	REPEAT	
21	J10 - 6		-					SPARE	
22	J10 - 7		-					SPARE	

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 7 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J10 - 8		-					SPARE	
2	J10 - 9		-					SPARE	
3	J10 - 10		-					SPARE	
4	J10 - 11		-					SPARE	
5	J10 - 12		-					SPARE	
6	J10 - 13		-					SPARE	
7									
8	J11 - 1		J22 - 4		Yellow		Wire Wrap	BUFFERED BAND CODE "8"	
9	J11 - 1		J34 - 1				PC BD	BUFFERED BAND CODE "8"	
10	J11 - 2		J22 - 5		Yellow		Wire Wrap	BUFFERED BAND CODE "4"	
11	J11 - 2		J34 - 8				PC BD	BUFFERED BAND CODE "4"	
12	J11 - 3		J22 - 6		Yellow		Wire Wrap	BUFFERED BAND CODE "2"	
13	J11 - 3		J34 - 3		Yellow		Wire Wrap	BUFFERED BAND CODE "2"	
14	J11 - 4		J22 - 13		Yellow		Wire Wrap	BUFFERED BAND CODE "1"	
15	J11 - 4		J34 - 4		Yellow		Wire Wrap	BUFFERED BAND CODE "1"	
16	J11 - 5		J20 - 6		Yellow		Wire Wrap	PLOTTER FORMAT SW. (4x4)	
17	J11 - 5		J27 - 5				PC BD	PLOTTER FORMAT SW. (4x4)	
18	J11 - 6		J20 - 3		Yellow		Wire Wrap	PLOTTER FORMAT SW. (16x1)	
19	J11 - 7		J20 - 4		Yellow		Wire Wrap	PLOTTER FORMAT SW. (8x2)	
20	J11 - 7		J27 - 7				PC BD	PLOTTER FORMAT SW. (8x2)	
21	J11 - 8		J20 - 8		Yellow		Wire Wrap	PLOTTER FORMAT SW. (1x1)	
22	J11 - 9		J29 - 1				PC BD	X GAIN BIT 7	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J11 - 10		J29 - 3				PC BD	X GAIN BIT 6	
2	J11 - 11		-					SPARE	
3	J11 - 12		J29 - 4				PC BD	X GAIN BITS 8, 4, 3	
4	J11 - 13		-					SPARE	
5									
6	J12 - 1		J27 - 2				PC BD	+X TO PLOTTER	
7	J12 - 2		J27 - 6				PC BD	$+Y_1$ TO PLOTTER	
8	J12 - 3		J30 - 7				PC BD	$+Y_2$ TO PLOTTER	
9	J12 - 4		GND BUSS				PC BD	GND	
10	J12 - 5		J27 - 3				PC BD	-X TO PLOTTER	
11	J12 - 6		J12 - 7				PC BD	$-Y_1$ TO PLOTTER	
12	J12 - 7		J12 - 6				PC BD	REPEAT	
13	J12 - 7		J27 - 9				PC BD	$-Y_2$ TO PLOTTER	
14	J12 - 8		J30 - 12				PC BD	PEN DROP	
15	J12 - 9		GND BUSS				PC BD	PEN DROP RETURN (GND)	
16	J12 - 10		-					SPARE	
17	J12 - 11		-					SPARE	
18	J12 - 12		-					SPARE	
19	J12 - 13		-					SPARE	
20									
21									
22									

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 9 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J13 - 1		GND BUSS				PC BD	GND	
2	J13 - 2		GND BUSS				PC BD	GND	
3	J13 - 3		+5V BUSS				PC BD	+5V DC	
4	J13 - 4		+24V BUSS				PC BD	+24V DC	
5	J13 - 5		J2 - 3				PC BD	REPEAT	
6	J13 - 6		J2 - 1				PC BD	REPEAT	
7	J13 - 7		J4 - 9				PC BD	REPEAT	
8	J13 - 8		J33 - 2				PC BD	$\overline{S}_1$ TO SU-125	
9	J13 - 9		J33 - 1				PC BD	$\overline{S}_0$ TO SU-125	
10	J13 - 10		J31 - 1				PC BD	$\overline{S}_9$ TO SU-125	
11	J13 - 11		J31 - 2				PC BD	$\overline{S}_{10}$ TO SU-125	
12	J13 - 12		J31 - 3				PC BD	$\overline{S}_{11}$ TO SU-125	
13	J13 - 13		J31 - 4				PC BD	$\overline{S}_{12}$ TO SU-125	
14									
15	J14 - 1		J17 - 9				PC BD	BUFFERED S_9 TO ACCESSORY	
16	J14 - 2		J17 - 10				PC BD	BUFFERED S_{10} TO ACCESSORY	
17	J14 - 3		J17 - 11				PC BD	BUFFERED S_{11} TO ACCESSORY	
18	J14 - 4		J17 - 12				PC BD	BUFFERED S_{12} TO ACCESSORY	
19	J14 - 5		J4 - 2		Yellow		Wire Wrap	REPEAT	
20	J14 - 6		J4 - 3		Yellow		Wire Wrap	REPEAT	
21	J14 - 7		J4 - 4				PC BD	REPEAT	
22	J14 - 8		J4 - 5		Yellow		Wire Wrap	REPEAT	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J14 - 9		J4 - 8		Yellow		Wire Wrap	REPEAT	
2	J14 - 10		J4 - 10		Yellow		Wire Wrap	REPEAT	
3	J14 - 11		J4 - 11		Yellow		Wire Wrap	REPEAT	
4	J14 - 12		J17 - 13				PC BD	BUFFERED S_{13} TO ACCESSORY	
5	J14 - 13		J32 - 1				PC BD	BUFFERED S_{14} TO ACCESSORY	
6									
7	J15 - 1		J32 - 2				PC BD	BUFFERED S_{15} TO ACCESSORY	
8	J15 - 2		J31 - 5				PC BD	$\overline{S}_{13}$ TO SU-125	
9	J15 - 3		J31 - 6				PC BD	$\overline{S}_{14}$ TO SU-125	
10	J15 - 4		J31 - 7				PC BD	$\overline{S}_{15}$ TO SU-125	
11	J15 - 5		J32 - 9				PC BD	BAND CODE $\overline{8}$	
12	J15 - 6		J32 - 8				PC BD	BAND CODE $\overline{4}$	
13	J15 - 7		J32 - 7				PC BD	BAND CODE $\overline{2}$	
14	J15 - 8		J32 - 6				PC BD	BAND CODE $\overline{1}$	
15	J15 - 9		J23 - 7		Yellow		Wire Wrap	BUFFERED S_0 TO SWEEP BD.	
16	J15 - 9		J32 - 5				PC BD	BUFFERED S_0 TO ACCESSORY	
17	J15 - 10		J33 - 7				PC BD	$\overline{S}_2$ TO SU-125	
18	J15 - 11		J33 - 8				PC BD	$\overline{S}_3$ TO SU-125	
19	J15 - 12		J33 - 9				PC BD	$\overline{S}_4$ TO SU-125	
20	J15 - 13		J33 - 10				PC BD	$\overline{S}_5$ TO SU-125	
21									
22									

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J16 - 1		J17 - 2				PC BD	BUFFERED S_2 TO ACCESSORY	
2	J16 - 2		J17 - 3				PC BD	BUFFERED S_3 TO ACCESSORY	
3	J16 - 3		J17 - 4				PC BD	BUFFERED S_4 TO ACCESSORY	
4	J16 - 4		J17 - 5				PC BD	BUFFERED S_5 TO ACCESSORY	
5	J16 - 5		J2 - 5		Yellow		Wire Wrap	REPEAT	
6	J16 - 6		J2 - 4		Yellow		Wire Wrap	REPEAT	
7	J16 - 7		J2 - 7		Yellow		Wire Wrap	REPEAT	
8	J16 - 8		J2 - 8		Yellow		Wire Wrap	REPEAT	
9	J16 - 9		J2 - 9		Yellow		Wire Wrap	REPEAT	
10	J16 - 10		J2 - 10		Yellow		Wire Wrap	REPEAT	
11	J16 - 11		J4 - 1		Yellow		Wire Wrap	REPEAT	
12	J16 - 12		J17 - 6				PC BD	BUFFERED S_6 TO ACCESSORY	
13	J16 - 13		J17 - 7				PC BD	BUFFERED S_7 TO ACCESSORY	
14	'								
15	J17 - 1		J34 - 5				PC BD	BUFFERED S_1 TO ACCESSORY	
16	J17 - 2		J16 - 1				PC BD	REPEAT	
17	J17 - 3		J16 - 2				PC BD	REPEAT	
18	J17 - 4		J16 - 3				PC BD	REPEAT	
19	J17 - 5		J16 - 4				PC BD	REPEAT	
20	J17 - 6		J16 - 12				PC BD	REPEAT	
21	J17 - 7		J16 - 13				PC BD	REPEAT	
22	J17 - 8		J34 - 13				PC BD	BUFFERED S_8 TO ACCESSORY	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J17 - 9		J14 - 1				PC BD	REPEAT	
2	J17 - 10		J14 - 2				PC BD	REPEAT	
3	J17 - 11		J14 - 3				PC BD	REPEAT	
4	J17 - 12		J14 - 4				PC BD	REPEAT	
5	J17 - 13		J14 - 12				PC BD	REPEAT	
6									
7	J18 - 1		GND BUSS				PC BD	GND	
8	J18 - 2		J22 - 1				PC BD	END OF BAND STEP COMMAND	
9	J18 - 3		J19 - 3				PC BD	STEP SWITCH	
10	J18 - 4		J19 - 4				PC BD	START SWITCH	
11	J18 - 5		J19 - 5				PC BD	START LOGIC	
12	J18 - 6		J19 - 6				PC BD	STOP LOGIC	
13	J18 - 7		J19 - 7				PC BD	STOP SWITCH	
14	J18 - 8		J19 - 8				PC BD	RESET LOGIC	
15	J18 - 9		J19 - 9				PC BD	RESET SWITCH	
16	J18 - 10		J19 - 10				PC BD	LOWER LEFT LOGIC	
17	J18 - 11		J19 - 11				PC BD	LOWER LEFT SWITCH	
18	J18 - 12		J19 - 12				PC BD	UPPER RIGHT LOGIC	
19	J18 - 13		J19 - 13				PC BD	UPPER RIGHT SWITCH	
20									
21									
22									

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 13 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J19 - 1		GND BUSS				PC BD	GND	
2	J19 - 2		J7 - 6				PC BD	REPEAT	
3	J19 - 3		J18 - 3				PC BD	REPEAT	
4	J19 - 4		J18 - 4				PC BD	REPEAT	
5	J19 - 5		J18 - 5				PC BD	REPEAT	
6	J19 - 5		J24 - 13				PC BD	START LOGIC	
7	J19 - 6		J18 - 6				PC BD	REPEAT	
8	J19 - 8		J30 - 13		Yellow		Wire Wrap	RESET LOGIC	
9	J19 - 7		J6 - 9				PC BD	REPEAT	
10	J19 - 7		J18 - 7				PC BD	REPEAT	
11	J19 - 8		J18 - 8				PC BD	REPEAT	
12	J19 - 9		J18 - 9				PC BD	REPEAT	
13	J19 - 10		J18 - 10				PC BD	REPEAT	
14	J19 - 11		J18 - 11				PC BD	REPEAT	
15	J19 - 12		J18 - 12				PC BD	REPEAT	
16	J19 - 13		J18 - 13				PC BD	REPEAT	
17									
18	J20 - 1		J24 - 11				PC BD	AUTO SWEEP SWITCH	
19	J20 - 2		J23 - 13				PC BD	FUNCTION SWITCH (COMM. 1)	
20	J20 - 2		J25 - 1				PC BD	FUNCTION SWITCH (COMM. 1)	
21	J20 - 3		J11 - 6		Yellow		Wire Wrap	REPEAT	
22	J20 - 4		J11 - 7		Yellow		Wire Wrap	REPEAT	

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 14 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J20 - 5		-					SPARE	
2	J20 - 6		J11 - 5		Yellow		Wire Wrap	REPEAT	
3	J20 - 7		-					SPARE	
4	J20 - 8		J11 - 8		Yellow		Wire Wrap	REPEAT	
5	J20 - 9		J21 - 2				PC BD	FUNCTION SWITCH (COMM. 2)	
6	J20 - 10		J21 - 9				PC BD	FUNCTION SWITCH (SECTOR)	
7	J20 - 11		J21 - 13				PC BD	FUNCTION SWITCH (SWEEP)	
8	J20 - 12		J21 - 6				PC BD	FUNCTION SWITCH (MANUAL)	
9	J20 - 13		-					SPARE	
10									
11	J21 - 1		GND BUSS				PC BD	GND	
12	J21 - 2		J20 - 9				PC BD	REPEAT	
13	J21 - 3		J8 - 2		Yellow		Wire Wrap	REPEAT	
14	J21 - 4		J8 - 3		Yellow		Wire Wrap	REPEAT	
15	J21 - 5		J10 - 1		Yellow		Wire Wrap	REPEAT	
16	J21 - 6		J20 - 12				PC BD	REPEAT	
17	J21 - 7		-					SPARE	
18	J21 - 8		J7 - 3				PC BD	REPEAT	
19	J21 - 9		J20 - 10				PC BD	REPEAT	
20	J21 - 10		GND BUSS				PC BD	GND	
21	J21 - 11		-15V BUSS				PC BD	-15V DC	
22	J21 - 12		J7 - 4				PC BD	REPEAT	

PROJECT ESC-125C INTERCINNECTION BOARD	SHEET 15 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J21 - 13		J20 - 11				PC BD	REPEAT	
2									
3	J22 - 1		J18 - 2				PC BD	REPEAT	
4	J22 - 2		J8 - 6		Yellow		Wire Wrap	REPEAT	
5	J22 - 3		J8 - 8		Yellow		Wire Wrap	REPEAT	
6	J22 - 4		J11 - 1		Yellow		Wire Wrap	REPEAT	
7	J22 - 5		J11 - 2		Yellow		Wire Wrap	REPEAT	
8	J22 - 6		J11 - 3		Yellow		Wire Wrap	REPEAT	
9	J22 - 7		J24 - 8				PC BD	SWEEP RESET LOGIC	
10	J22 - 8		J8 - 10		Yellow		Wire Wrap	REPEAT	
11	J22 - 9		J8 - 11		Yellow		Wire Wrap	REPEAT	
12	J22 - 10		J24 - 10				PC BD	RETRACE GATE	
13	J22 - 11		J8 - 13		Yellow		Wire Wrap	REPEAT	
14	J22 - 12		J8 - 12		Yellow		Wire Wrap	REPEAT	
15	J22 - 13		J11 - 4		Yellow		Wire Wrap	REPEAT	
16									
17	J23 - 1		J10 - 2				PC BD	REPEAT	
18	J23 - 2		J8 - 1				PC BD	REPEAT	
19	J23 - 3		J10 - 4		Yellow		Wire Wrap	REPEAT	
20	J23 - 4		J10 - 3		Yellow		Wire Wrap	REPEAT	
21	J23 - 4		GND BUSS				PC BD	GND	
22	J23 - 5		+24V BUSS				PC BD	+24V DC	

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 16 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J23 - 6		J7 - 2		Yellow		Wire Wrap	REPEAT	
2	J23 - 7		J15 - 9		Yellow		Wire Wrap	REPEAT	
3	J23 - 8		J25 - 3				PC BD	Y OUT TO DISPLAY BD	
4	J23 - 9		J8 - 7		Yellow		Wire Wrap	REPEAT	
5	J23 - 10		J7 - 1				PC BD	REPEAT	
6	J23 - 11		J9 - 1		Yellow		Wire Wrap	REPEAT	
7	J23 - 12		TERMINAL E5				PC BD	HORIZONTAL OUTPUT TO SCOPE	
8	J23 - 13		J20 - 2				PC BD	REPEAT	
9									
10	J24 - 1		-					SPARE	
11	J24 - 2		J5 - 7				PC BD	REPEAT	
12	J24 - 3		J5 - 10				PC BD	REPEAT	
13	J24 - 4		J5 - 12				PC BD	REPEAT	
14	J24 - 5		J30 - 11		Yellow		Wire Wrap	PEN DROP CONTROL	
15	J24 - 6		J5 - 11				PC BD	REPEAT	
16	J24 - 7		J5 - 9				PC BD	REPEAT	
17	J24 - 8		J22 - 7				PC BD	REPEAT	
18	J24 - 9		TERMINAL E7				PC BD	BLANKING OUTPUT TO SCOPE	
19	J24 - 10		J22 - 10				PC BD	REPEAT	
20	J24 - 11		J20 - 1				PC BD	REPEAT	
21	J24 - 12		+15V BUSS				PC BD	+15V DC	
22	J24 - 13		J19 - 5				PC BD	REPEAT	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J25 - 1		J20 - 2				PC BD	REPEAT	
2	J25 - 2		GND BUSS				PC BD	GND (X OFFSET BIT 1)	
3	J25 - 3		J23 - 8				PC BD	REPEAT	
4	J25 - 4		GND BUSS				PC BD	GND	
5	J25 - 5		-					SPARE	
6	J25 - 6		-					SPARE	
7	J25 - 7		+15V BUSS				PC BD	+15V DC	
8	J25 - 8		-15V BUSS				PC BD	-15V DC	
9	J25 - 9		+5V BUSS				PC BD	+5V DC	
10	J25 - 10		GND BUSS				PC BD	GND	
11	J25 - 11		J2 - 13				PC BD	REPEAT	
12	J25 - 12		J2 - 2				PC BD	REPEAT	
13	J25 - 13		J2 - 6				PC BD	REPEAT	
14									
15	J26 - 1		J30 - 1				PC BD	$+Y_1$ AUXILIARY INPUT	
16	J26 - 2		J30 - 2				PC BD	$-Y_1$ AUXILIARY INPUT	
17	J26 - 3		J30 - 4				PC BD	$+Y_2$ AUXILIARY INPUT	
18	J26 - 4		J30 - 3				PC BD	$-Y_2$ AUXILIARY INPUT	
19	J26 - 5		GND BUSS				PC BD	GND	
20	J26 - 6		-					SPARE	
21	J26 - 7		-					SPARE	
22	J26 - 8		-					SPARE	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J26 - 9		-					SPARE	
2	J26 - 10		-					SPARE	
3	J26 - 11		-					SPARE	
4	J26 - 12		-					SPARE	
5	J26 - 13		-					SPARE	
6									
7	J27 - 1		GND BUSS				PC BD	GND(X OFFSET BIT 1)	
8	J27 - 2		J12 - 1				PC BD	REPEAT	
9	J27 - 3		J12 - 5				PC BD	REPEAT	
10	J27 - 4		-					SPARE	
11	J27 - 5		J11 - 5				PC BD	REPEAT	
12	J27 - 6		J12 - 2				PC BD	REPEAT	
13	J27 - 7		J11 - 7				PC BD	REPEAT	
14	J27 - 8		J28 - 2				PC BD	Y GAIN BITS 1-6	
15	J27 - 9		J12 - 7				PC BD	REPEAT	
16	J27 - 10		-					SPARE	
17	J27 - 11		J28 - 7				PC BD	Y OFFSET BIT 8 (MSB)	
18	J27 - 12		J28 - 10				PC BD	Y OFFSET BIT 7	
19	J27 - 13		-					SPARE	
20									
21									
22									

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J28 - 1		J29 - 2				PC BD	X GAIN BIT 5	
2	J28 - 2		J27 - 8				PC BD	REPEAT	
3	J28 - 3		J29 - 7				PC BD	X OFFSET BIT 5	
4	J28 - 4		J29 - 8				PC BD	X OFFSET BIT 6	
5	J28 - 5		J29 - 9				PC BD	X OFFSET BIT 7	
6	J28 - 6		J29 - 10				PC BD	X OFFSET BIT 8	
7	J28 - 7		J27 - 11				PC BD	REPEAT	
8	J28 - 8		+5V BUSS				PC BD	+5V DC	
9	J28 - 9		+5V BUSS				PC BD	+5V DC	
10	J28 - 10		J27 - 12				PC BD	REPEAT	
11	J28 - 11		-					SPARE	
12	J28 - 12		GND BUSS				PC BD	GND	
13	J28 - 13		GND BUSS				PC BD	GND	
14									
15	J29 - 1		J11 - 9				PC BD	REPEAT	
16	J29 - 2		J28 - 1				PC BD	REPEAT	
17	J29 - 3		J11 - 10				PC BD	REPEAT	
18	J29 - 4		J11 - 12				PC BD	REPEAT	
19	J29 - 4		J29 - 5				PC BD	X GAIN BIT 2	
20	J29 - 5		J29 - 4				PC BD	REPEAT	
21	J29 - 5		J29 - 6				PC BD	X GAIN BIT 1 (LSB)	
22	J29 - 6		J29 - 5				PC BD	REPEAT	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J29 - 7		J28 - 3				PC BD	REPEAT	
2	J29 - 8		J28 - 4				PC BD	REPEAT	
3	J29 - 9		J28 - 5				PC BD	REPEAT	
4	J29 - 10		J28 - 6				PC BD	REPEAT	
5	J29 - 11		GND BUSS				PC BD	GND (X OFFSET BITS 3, 4)	
6	J29 - 12		GND BUSS				PC BD	GND (X OFFSET BIT 2)	
7	J29 - 13		GND BUSS				PC BD	GND (X OFFSET BIT 1)	
8									
9	J30 - 1		J26 - 1				PC BD	REPEAT	
10	J30 - 2		J26 - 2				PC BD	REPEAT	
11	J30 - 3		J26 - 4				PC BD	REPEAT	
12	J30 - 4		J26 - 3				PC BD	REPEAT	
13	J30 - 5		TERMINAL E4				PC BD	AM VIDEO INPUT	
14	J30 - 6		-					SPARE	
15	J30 - 7		J12 - 3				PC BD	REPEAT	
16	J30 - 8		J5 - 2		Yellow		Wire Wrap	REPEAT	
17	J30 - 9		J5 - 3		Yellow		Wire Wrap	REPEAT	
18	J30 - 10		J5 - 4		Yellow		Wire Wrap	REPEAT	
19	J30 - 11		J24 - 5		Yellow		Wire Wrap	REPEAT	
20	J30 - 12		J9 - 10		Yellow		Wire Wrap	REPEAT	
21	J30 - 12		J12 - 8				PC BD	REPEAT	
22	J30 - 13		J19 - 8					REPEAT	

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J31 - 1		J13 - 10				PC BD	REPEAT	
2	J31 - 2		J13 - 11				PC BD	REPEAT	
3	J31 - 3		J13 - 12				PC BD	REPEAT	
4	J31 - 4		J13 - 13				PC BD	REPEAT	
5	J31 - 5		J15 - 2				PC BD	REPEAT	
6	J31 - 6		J15 - 3				PC BD	REPEAT	
7	J31 - 7		J15 - 4				PC BD	REPEAT	
8	J31 - 8		GND BUSS				PC BD	GND	
9	J31 - 9		+24V BUSS				PC BD	+24V DC	
10	J31 - 10		J9 - 6				PC BD	REPEAT	
11	J31 - 11		J9 - 7				PC BD	REPEAT	
12	J31 - 12		J7 - 9				PC BD	REPEAT	
13	J31 - 13		J9 - 2		Yellow		Wire Wrap	REPEAT	
14									
15	J32 - 1		J14 - 13				PC BD	REPEAT	
16	J32 - 2		J15 - 1				PC BD	REPEAT	
17	J32 - 3		GND BUSS				PC BD	GND	
18	J32 - 4		GND BUSS				PC BD	GND (SHIELD)	
19	J32 - 5		J15 - 9				PC BD	REPEAT	
20	J32 - 6		J15 - 8				PC BD	REPEAT	
21	J32 - 7		J15 - 7				PC BD	REPEAT	
22	J32 - 8		J15 - 6				PC BD	REPEAT	

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 22 OF 24	DWG NO. A-5369	REV

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J32 - 9		J15 - 5				PC BD	REPEAT	
2	J32 - 10		+24V BUSS				PC BD	+24V DC	
3	J32 - 11		+5V BUSS				PC BD	+5V DC	
4	J32 - 12		+15V BUSS				PC BD	+15V DC	
5	J32 - 13		-15V BUSS				PC BD	-15V DC	
6									
7	J33 - 1		J13 - 9				PC BD	REPEAT	
8	J33 - 2		J13 - 8				PC BD	REPEAT	
9	J33 - 3		J34 - 2				PC BD	BUFFERED BAND CODE "4"	
10	J33 - 4		J34 - 4				PC BD	BUFFERED BAND CODE "1"	
11	J33 - 5		J34 - 9				PC BD	BUFFERED BAND CODE "8"	
12	J33 - 6		J34 - 7				PC BD	BUFFERED BAND CODE "2"	
13	J33 - 7		J15 - 10				PC BD	REPEAT	
14	J33 - 8		J15 - 11				PC BD	REPEAT	
15	J33 - 9		J15 - 12				PC BD	REPEAT	
16	J33 - 10		J15 - 13				PC BD	REPEAT	
17	J33 - 11		J34 - 12				PC BD	$\overline{S}_6$ TO SU-125	
18	J33 - 12		J34 - 11				PC BD	$\overline{S}_7$ TO SU-125	
19	J33 - 13		J34 - 10				PC BD	$\overline{S}_8$ TO SU-125	
20									
21									
22									

LINE	FROM A2A7	SYMBOL	TO A2A7	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	J34 - 1		J11 - 1				PC BD	REPEAT	
2	J34 - 1		J34 - 9				PC BD	BUFFERED BAND CODE "8"	
3	J34 - 2		J33 - 3				PC BD	REPEAT	
4	J34 - 2		J34 - 8				PC BD	BUFFERED BAND CODE "4"	
5	J34 - 3		J11 - 3		Yellow		Wire Wrap	REPEAT	
6	J34 - 3		J34 - 7				PC BD	BUFFERED BAND CODE "2"	
7	J34 - 4		J11 - 4		Yellow		Wire Wrap	REPEAT	
8	J34 - 4		J33 - 4				PC BD	REPEAT	
9	J34 - 5		J17 - 1				PC BD	REPEAT	
10	J34 - 6		-					SPARE	
11	J34 - 7		J33 - 6				PC BD	REPEAT	
12	J34 - 7		J34 - 3				PC BD	REPEAT	
13	J34 - 8		J11 - 2				PC BD	REPEAT	
14	J34 - 8		J34 - 2				PC BD	REPEAT	
15	J34 - 9		J33 - 5				PC BD	REPEAT	
16	J34 - 9		J34 - 1				PC BD	REPEAT	
17	J34 - 10		J33 - 13				PC BD	REPEAT	
18	J34 - 11		J33 - 12				PC BD	REPEAT	
19	J34 - 12		J33 - 11				PC BD	REPEAT	
20	J34 - 13		J17 - 8				PC BD	REPEAT	
21									
22									

PROJECT ESC-125C INTERCONNECTION BOARD	SHEET 24 OF 24	DWG NO. A-5369	REV

LINE	FROM A3J1	SYMBOL	TO A2A7J8 & J9	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J1 - A		P8 - 1		BROWN			EMC-25 TUNE IN (ARM)	
2	A3J1 - B		-					SPARE	
3	A3J1 - C		P8 - 2		RED			TUNE VOLTAGE OUT (TO EMC-25)	
4	A3J1 - D		-					SPARE	
5	A3J1 - E		-					SPARE	
6	A3J1 - F		P9 - 2		RED			ANTENNA INHIBIT	
7	A3J1 - H		-					SPARE	
8	A3J1 - J		P8 - 3		ORANGE			TUNE GND	
9	A3J1 - K		-					SPARE	
10	A3J1 - L		-					SPARE	
11	A3J1 - M		-					SPARE	
12	A3J1 - N		-					SPARE	
13	A3J1 - P		P8 - 4		YELLOW			GAIN CONTROL	
14	A3J1 - R		P9 - 8		GRAY			I.G. COMMAND (-6V ACTIVATED)	
15	A3J1 - S		P8 - 5		GREEN			BANDWIDTH COMMAND	
16	A3J1 - T		P9 - 10		BLACK			DWELL COMMAND (TO EMC-25)	
17	A3J1 - U		P9 - 11		BROWN			BANDWIDTH SELECT (TO EMC-25)	
18	A3J1 - V		P9 - 5		GREEN			+12VDC INPUT (FROM EMC-25)	
19	A3J1 - W		-					SPARE	
20	A3J1 - X		-					SPARE	
21	A3J1 - Y		P8 - 6		BLUE			BAND STEP ↓ (DOWN)	
22	A3J1 - Z		-					SPARE	

PROJECT	SHEET 1 OF 4	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J1 (EMC-25) TO INTERCONNECTION BOARD A2A7 - J8 & J9			

LINE	FROM A3J1	SYMBOL	TO A2A7-J8 & J9	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J1 - a		-					SPARE	
2	A3J1 - b		P8 - 7		VIOLET			EMC-25 +Y IN	
3	A3J1 - c		-					SPARE	
4	A3J1 - d		-					SPARE	
5	A3J1 - e		P8 - 8		GRAY			BAND STEP ↑ (UP)	
6	A3J1 - f		-					SPARE	
7	A3J1 - h		P8 - 9		WHITE			BAND LOGIC COMMAND	
8	A3J1 - j		-					SPARE	
9	A3J1 - k		P8 - 10		BLACK			BAND LOGIC "1"	
10	A3J1 - m		-					SPARE	
11	A3J1 - n		P8 - 11		BROWN			BAND LOGIC "2"	
12	A3J1 - p		-					SPARE	
13	A3J1 - r		P8 - 12		RED			BAND LOGIC "4"	
14	A3J1 - s		-					SPARE	
15	A3J1 - t		P8 - 13		ORANGE			BAND LOGIC "8"	
16	A3J1 - u		-					SPARE	
17	A3J1 - v		-					SPARE	
18	A3J1 - x		P9 - 3		ORANGE			I.G. CONTACTS	
19	A3J1 - y		-					SPARE	
20	A3J1 - z		P9 - 4		YELLOW			I.G. LEVEL	
21	A3J1 - AA		P9 - 1		BROWN			GND	
22	A3J1 - BB		P9 - 9		WHITE			SHUNT CAL (-12V ACTIVATES)	

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J1 (EMC-25) TO INTERCONNECTION BOARD A2A7 - J8 & J9	SHEET 2 OF 4		

LINE	FROM A3J1	SYMBOL	TO A2A7 - J8 & J9	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J1 - CC		P9 - 7		VIOLET			-RAW IN (FROM EMC-25)	
2	A3J1 - DD		-					SPARE	
3	A3J1 - EE		-					SPARE	
4	A3J1 - FF		-					SPARE	
5	A3J1 - HH		P9 - 6		BLUE			+RAW IN (FROM EMC-25)	
6									
7	A2A7 - J8		A3J1						
8	P8 - 1		A3J1 - A		BROWN			REPEAT	
9	P8 - 2		A3J1 - C		RED			REPEAT	
10	P8 - 3		A3J1 - J		ORANGE			REPEAT	
11	P8 - 4		A3J1 - P		YELLOW			REPEAT	
12	P8 - 5		A3J1 - S		GREEN			REPEAT	
13	P8 - 6		A3J1 - Y		BLUE			REPEAT	
14	P8 - 7		A3J1 - b		VIOLET			REPEAT	
15	P8 - 8		A3J1 - e		GRAY			REPEAT	
16	P8 - 9		A3J1 - h		WHITE			REPEAT	
17	P8 - 10		A3J1 - k		BLACK			REPEAT	
18	P8 - 11		A3J1 - n		BROWN			REPEAT	
19	P8 - 12		A3J1 - r		RED			REPEAT	
20	P8 - 13		A3J1 - t		ORANGE			REPEAT	
21									
22									

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J1 (EMC-25) TO INTERCONNECTION BOARD A2A7 - J8 & J9	3 OF 4		

LINE	FROM A2A7 - J9	SYMBOL	TO A3J1	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P9 - 1		A3J1 - AA		BROWN			REPEAT	
2	P9 - 2		A3J1 - F		RED			REPEAT	
3	P9 - 3		A3J1 - x		ORANGE			REPEAT	
4	P9 - 4		A3J1 - z		YELLOW			REPEAT	
5	P9 - 5		A3J1 - V		GREEN			REPEAT	
6	P9 - 6		A3J1 - HH		BLUE			REPEAT	
7	P9 - 7		A3J1 - CC		VIOLET			REPEAT	
8	P9 - 8		A3J1 - R		GRAY			REPEAT	
9	P9 - 9		A3J1 - BB		WHITE			REPEAT	
10	P9 - 10		A3J1 - T		BLACK			REPEAT	
11	P9 - 11		A3J1 - U		BROWN			REPEAT	
12	P9 - 12		-					SPARE	
13	P9 - 13		-					SPARE	
14									
15									
16									
17									
18									
19									
20									
21									
22									

PROJECT		SHEET 4 OF 4	DWG NO.	REV
	ESC-125C WIRE LIST CONNECTOR A3J1 (EMC-25) TO INTERCONNECTION BOARD A2A7 - J8 & J9			

REVISIONS				
SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR

A3J1 (EMC-25) TO INTERCONNECTION BOARD A2A7-J8 & J9

FIGURE 6-2

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY	PARTS LIST

TITLE

ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J1 (EMC-25) TO
INTERCONNECTION BOARD
A2A7-J8 & J9

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

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A DIVISION OF PENRIL CORP.
100 Church St., Amsterdam, New York 12010

SIZE	DRAWING NUMBER	ISSUE
A	5371	

SCALE: SHEET OF 4

Section VI

Miscellaneous Information

6.1 General

This section contains the following information:

a. A point to point listing of the 34 connectors located on the A2A7 Interconnection board Figure 6-1.

b. A point to point listing of the following rear panel connectors to the A2A7 Interconnection board.

1. A3J1 (EMC-25) to A2A7 Figure 6-2.

2. A3J2 (EMC-10) to A2A7 Figure 6-3.

3. A3J3 (AUXILIARY) to A2A7 Figure 6-4.

4. A3J4 (PLOTTER) to A2A7 Figure 6-5.

5. A3J5 (SU-125) to A2A7 Figure 6-6.

6. A3J6 (ACCESSORY) to A2A7 Figure 6-7.

REVISIONS				
SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR

A3J2 (EMC-10) TO INTERCONNECTION BOARD A2A7-J10

FIGURE 6-3

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY.	PARTS LIST

TITLE

ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J2 (EMC-10) TO
INTERCONNECTION BOARD A2A7-J10

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

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SIZE	DRAWING NUMBER	ISSUE
A	5372	

SCALE: SHEET OF 2

LINE	FROM A3J2	SYMBOL	TO A2A7-J10	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J2 - A		P10 - 1		BROWN			TUNE VOLTAGE OUT (TO EMC-10)	
2	A3J2 - B		P10 - 2		RED			TUNE VOLTAGE IN (EMC-10 POT ARM)	
3	A3J2 - C		-					SPARE	
4	A3J2 - D		P10 - 5		GREEN			EMC-10 Y GND	
5	A3J2 - E		-					SPARE	
6	A3J2 - F		-					SPARE	
7	A3J2 - H		-					SPARE	
8	A3J2 - J		-					SPARE	
9	A3J2 - K		P10 - 3		ORANGE			EMC-10 GND	
10	A3J2 - L		-					SPARE	
11	A3J2 - M		P10 - 4		YELLOW			EMC-10 +Y IN	
12									
13	A2A7 - J10		A3J2						
14	P10 - 1		A3J2 - A		BROWN			REPEAT	
15	P10 - 2		A3J2 - B		RED			REPEAT	
16	P10 - 3		A3J2 - K		ORANGE			REPEAT	
17	P10 - 4		A3J2 - M		YELLOW			REPEAT	
18	P10 - 5		A3J2 - D		GREEN			REPEAT	
19	P10 - 6		-					SPARE	
20	P10 - 7		-					SPARE	
21									
22									

PROJECT	ESC-125C WIRE LIST CONNECTOR A3J2 (EMC-10) TO INTERCONNECTION BOARD A2A7-J10	SHEET 1 OF 2	DWG NO.	REV

LINE	FROM A2A7 - J10	SYMBOL	TO A3J2	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P10 - 8		-					SPARE	
2	P10 - 9		-					SPARE	
3	P10 - 10		-					SPARE	
4	P10 - 11		-					SPARE	
5	P10 - 12		-					SPARE	
6	P10 - 13		-					SPARE	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

PROJECT	ESC-125C WIRE LIST CONNECTOR A3J2 (EMC-10) TO INTERCONNECTION BOARD A2A7 - J10	SHEET 2 OF 2	DWG NO.	REV

REVISIONS				
SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J4 (AUXILIARY) TO INTERCONNECTION BOARD A2A7-J26

FIGURE 6-4

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY.	PARTS LIST

TITLE

ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J3 (AUXILIARY) TO
INTERCONNECTION BOARD A2A7-J26

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

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SIZE	DRAWING NUMBER	ISSUE
A	5373	

SCALE: SHEET OF 2

LINE	FROM A3J3	SYMBOL	TO A2A7 - J26	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J3 - A		-					SPARE	
2	A3J3 - B		-					SPARE	
3	A3J3 - C		-					SPARE	
4	A3J3 - D		-					SPARE	
5	A3J3 - E		P26 - 5		GREEN			GND BUSS	
6	A3J3 - F		P26 - 2		RED			$-Y_1$ RETURN(AUX #1 RETURN)	
7	A3J3 - H		P26 - 3		ORANGE			$+Y_2$ INPUT(AUX #2 INPUT)	
8	A3J3 - J		P26 - 4		YELLOW			$-Y_2$ RETURN (AUX #2 RETURN)	
9	A3J3 - K		-					SPARE	
10	A3J3 - L		-					SPARE	
11	A3J3 - M		P26 - 1		BROWN			$+Y_1$ INPUT (AUX #1 INPUT)	
12									
13	A2A7 - J26		A3J3						
14	P26 - 1		A3J3 - M		BROWN			REPEAT	
15	P26 - 2		A3J3 - F		RED			REPEAT	
16	P26 - 3		A3J3 - H		ORANGE			REPEAT	
17	P26 - 4		A3J3 - J		YELLOW			REPEAT	
18	P26 - 5		A3J3 - E		GREEN			REPEAT	
19	P26 - 6		-					SPARE	
20	P26 - 7		-					SPARE	
21									
22									

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J3 (AUXILIARY) TO INTERCONNECTION BOARD A2A7 - J26	1 OF 2		

LINE	FROM A2A7 - J26	SYMBOL	TO A3J3	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P26 - 8		-					SPARE	
2	P26 - 9		-					SPARE	
3	P26 - 10		-					SPARE	
4	P26 - 11		-					SPARE	
5	P26 - 12		-					SPARE	
6	P26 - 13		-					SPARE	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J3 (AUXILIARY) TO INTERCONNECTION BOARD A2A7 - J26	2 OF 2		

SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J4 (PLOTTER) TO INTERCONNECTION BOARD A2A7-J12

FIGURE 6-5

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY.	PARTS LIST

TITLE

ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J4 (PLOTTER) TO
INTERCONNECTION BOARD A2A7-J12

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

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A DIVISION OF PENRIL CORP.
100 Church St., Amsterdam, New York 12010

SIZE	DRAWING NUMBER	ISSUE
A	5375	

SCALE: SHEET OF 2

LINE	FROM A3J4	SYMBOL	TO A2A7-J12	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J4 - A		P12 - 4		YELLOW			PEN DROP RETURN	
2	A3J4 - B		P12 - 1		BROWN			+X OUTPUT TO PLOTTER	
3	A3J4 - C		-					SPARE	
4	A3J4 - D		P12 - 8		GRAY			PEN DROP	
5	A3J4 - E		P12 - 5		GREEN			-X OUTPUT TO PLOTTER	
6	A3J4 - F		P12 - 6		BLUE			$-Y_1$ OUTPUT TO PLOTTER	
7	A3J4 - H		P12 - 3		ORANGE			$+Y_2$ OUTPUT TO PLOTTER	
8	A3J4 - J		P12 - 7		VIOLET			$-Y_2$ OUTPUT TO PLOTTER	
9	A3J4 - K		-					SPARE	
10	A3J4 - L		-					SPARE	
11	A3J4 - M		P12 - 2		RED			$+Y_1$ OUTPUT TO PLOTTER	
12									
13	A2A7 - J12		A3J4						
14	P12 - 1		A3J4 - B		BROWN			REPEAT	
15	P12 - 2		A3J4 - M		RED			REPEAT	
16	P12 - 3		A3J4 - H		ORANGE			REPEAT	
17	P12 - 4		A3J4 - A		YELLOW			REPEAT	
18	P12 - 5		A3J4 - E		GREEN			REPEAT	
19	P12 - 6		A3J4 - F		BLUE			REPEAT	
20									
21									
22									

PROJECT		SHEET 1 OF 2	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J4 (PLOTTER) TO INTERCONNECTION BOARD A2A7-J12				

LINE	FROM A2A7 - J12	SYMBOL	TO A3J4	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P12 - 7		A3J4 - J		VIOLET			REPEAT	
2	P12 - 8		A3J4 - D		GRAY			REPEAT	
3	P12 - 9		-					SPARE	
4	P12 - 10		-					SPARE	
5	P12 - 11		-					SPARE	
6	P12 - 12		-					SPARE	
7	P12 - 13		-					SPARE	
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J4 (PLOTTER) TO INTERCONNECTION BOARD A2A7 - J12	SHEET 2 OF 2		

REVISIONS

SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J5 (SU-125) TO INTERCONNECTION BOARD A2A7-J31 & J33

FIGURE 6-6

ITEM NO.	QTY	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY.	PARTS LIST

TITLE
ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J5 (SU-125) TO
INTERCONNECTION BOARD
A2A7-J31 & J33

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

ELECTRO-METRICS
A DIVISION OF PENRIL CORP.
100 Church St., Amsterdam, New York 12010

SIZE	DRAWING NUMBER	ISSUE
A	5376	

SCALE: SHEET OF 3

LINE	FROM A3J5	SYMBOL	TO A2A7-J31&J33	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J5 - A		P33 - 1		BROWN			STATE So TO SU-125	
2	A3J5 - B		-					SPARE	
3	A3J5 - C		P33 - 2		RED			STATE $\overline{S}_1$ TO SU-124	
4	A3J5 - D		-					SPARE	
5	A3J5 - E		P33 - 5		GREEN			BUFFERED BAND CODE 8	
6	A3J5 - F		P33 - 6		BLUE			BUFFERED BAND CODE 2	
7	A3J5 - H		P33 - 4		YELLOW			BUFFERED BAND CODE 1	
8	A3J5 - J		P33 - 3		ORANGE			BUFFERED BAND CODE 4	
9	A3J5 - K		P33 - 7		VIOLET			STATE $\overline{S}_2$ TO SU-125	
10	A3J5 - L		P33 - 8		GRAY			STATE $\overline{S}_3$ TO SU-125	
11	A3J5 - M		-					SPARE	
12	A3J5 - N		P33 - 9		WHITE			STATE $\overline{S}_4$ TO SU-125	
13	A3J5 - P		P33 - 10		BLACK			STATE $\overline{S}_5$ TO SU-125	
14	A3J5 - R		P33 - 11		BROWN			STATE $\overline{S}_6$ TO SU-125	
15	A3J5 - S		P33 - 12		RED			STATE $\overline{S}_7$ TO SU-125	
16	A3J5 - T		P33 - 13		ORANGE			STATE $\overline{S}_8$ TO SU-125	
17	A3J5 - U		P31 - 1		BROWN			STATE $\overline{S}_9$ TO SU-125	
18	A3J5 - V		P31 - 2		RED			STATE $\overline{S}_{10}$ TO SU-125	
19	A3J5 - W		P31 - 3		ORANGE			STATE $\overline{S}_{11}$ TO SU-125	
20	A3J5 - X		P31 - 12		RED			CAL COMMAND	
21	A3J5 - Y		P31 - 4		YELLOW			STATE $\overline{S}_{12}$ TO SU-125	
22	A3J5 - Z		P31 - 5		GREEN			STATE $\overline{S}_{13}$ TO SU-125	

PROJECT	SHEET 1 OF 3	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J5 (SU-125) TO INTERCONNECTION BOARD A2A7 - J31 & J33			

LINE	FROM A2J5	SYMBOL	TO A2A7-J31&J33	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J5 - AA		P31 - 6		BLUE			STATE $\overline{S}_{14}$ TO SU-125	
2	A3J5 - BB		-					SPARE	
3	A3J5 - CC		-					SPARE	
4	A3J5 - DD		P31 - 13		ORANGE			ANTENNA INHIBIT	
5	A3J5 - EE		P31 - 7		VIOLET			STATE $\overline{S}_{15}$ TO SU-125	
6	A3J5 - FF		P31 - 8		GRAY			GND BUSS	
7	A3J5 - HH		-					SPARE	
8	A3J5 - JJ		-		WHITE			+24V OUT TO SU-125	
9	A3J5 - KK		P31 - 10		BLACK			+RAW OUT TO SU-125	
10	A3J5 - LL		-					SPARE	
11	A3J5 - MM		P31 - 11		BROWN			-RAW OUT TO SU-125	
12	A3J5 - NN		-					SPARE	
13									
14	A2A7 - J31		A3J5						
15	P31 - 1		A3J5 - U		BROWN			REPEAT	
16	P31 - 2		A3J5 - V		RED			REPEAT	
17	P31 - 3		A3J5 - W		ORANGE			REPEAT	
18	P31 - 4		A3J5 - Y		YELLOW			REPEAT	
19	P31 - 5		A3J5 - Z		GREEN			REPEAT	
20	P31 - 6		A3J5 - AA		BLUE			REPEAT	
21	P31 - 7		A3J5 - EE		VIOLET			REPEAT	
22	P31 - 8		A3J5 - FF		GRAY			REPEAT	

PROJECT		SHEET	DWG NO.	REV
ESC-125C (SU-125) A2A7-J31	WIRE LIST CONNECTOR A3J5 TO INTERCONNECTION BOARD &J33	2 OF 3		

LINE	FROM A2A7 - J31	SYMBOL	TO A3J5	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P31 - 9		A3J5 - JJ		WHITE			REPEAT	
2	P31 - 10		A3J5 - KK		BLACK			REPEAT	
3	P31 - 11		A3J5 - MM		BROWN			REPEAT	
4	P31 - 12		A3J5 - X		RED			REPEAT	
5	P31 - 13		A3J5 - DD		ORANGE			REPEAT	
6									
7	A2A7 - J33		A3J5						
8	P33 - 1		A3J5 - A		BROWN			REPEAT	
9	P33 - 2		A3J5 - C		RED			REPEAT	
10	P33 - 3		A3J5 - J		ORANGE			REPEAT	
11	P33 - 4		A3J5 - H		YELLOW			REPEAT	
12	P33 - 5		A3J5 - E		GREEN			REPEAT	
13	P33 - 6		A3J5 - F		BLUE			REPEAT	
14	P33 - 7		A3J5 - K		VIOLET			REPEAT	
15	P33 - 8		A3J5 - L		GRAY			REPEAT	
16	P33 - 9		A3J5 - N		WHITE			REPEAT	
17	P33 - 10		A3J5 - P		BLACK			REPEAT	
18	P33 - 11		A3J5 - R		BROWN			REPEAT	
19	P33 - 12		A3J5 - 5		RED			REPEAT	
20	P33 - 13		A3J5 - T		ORANGE			REPEAT	
21									
22									

PROJECT	SHEET 3 OF 3	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J5 (SU-125) TO INTERCONNECTION BOARD A2A7-J31 &J33			

SYM	DESCRIPTION	BY	DATE	APPROVAL

ESC-125C
WIRE CONNECTION LIST
REAR PANEL CONNECTOR

A3J6 (ACCESSORY) TO INTERCONNECTION BOARD A2A7-J17 & J32

FIGURE 6-7

ITEM NO.	QTY.	PART NUMBER	REF. DES.	DESCRIPTION	SOURCE

MATERIAL	FINISH

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

FRACTIONAL ± 1/64
DECIMAL .XXX ± .005
ANGULAR ± 0° 30'
SURFACE FINISH 125

BREAK ALL SHARP EDGES .010
ALL DIMENSIONS INCHES
DO NOT SCALE THIS DRAWING

ORIGINALLY USED ON	
NEXT ASSY	PARTS LIST

TITLE
ESC-125C WIRE CONNECTION LIST
REAR PANEL CONNECTOR
A3J6 (ACCESSORY) TO
INTERCONNECTION BOARD
A2A7-J17 & J32

DRAWN	DATE	
CHECKED	DATE	
APPROVED	DATE	
APPROVED	DATE	
REDRAWN	DATE	

ELECTRO-METRICS
A DIVISION OF PENRIL CORP.
100 Church St., Amsterdam, New York 12010

SIZE	DRAWING NUMBER	ISSUE
A	5377	

SCALE: SHEET OF 3

LINE	FROM A3J6	SYMBOL	TO A2A7-J17 & J32	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J6 - A		P17 - 1		BROWN			STATE S_1	
2	A3J6 - B		P17 - 2		RED			STATE S_2	
3	A3J6 - C		P32 - 5		GREEN			STATE So	
4	A3J6 - D		P32 - 6		BLUE			BAND CODE $\overline{1}$	
5	A3J6 - E		P17 - 3		ORANGE			STATE S_3	
6	A3J6 - F		P17 - 4		YELLOW			STATE S_4	
7	A3J6 - H		P32 - 7		VIOLET			BAND CODE $\overline{2}$	
8	A3J6 - J		P32 - 8		GRAY			BAND CODE $\overline{4}$	
9	A3J6 - K		P17 - 5		GREEN			STATE S_5	
10	A3J6 - L		P17 - 6		BLUE			STATE S_6	
11	A3J6 - M		P32 - 9		WHITE			BAND CODE $\overline{8}$	
12	A3J6 - N		P32 - 10		BLACK			+24VDC OUT	
13	A3J6 - P		P17 - 7		VIOLET			STATE S_7	
14	A3J6 - R		P17 - 8		GRAY			STATE S_8	
15	A3J6 - S		P32 - 12		RED			+15VDC OUT	
16	A3J6 - T		P32 - 12		ORANGE			-15VDC OUT	
17	A3J6 - U		P17 - 9		WHITE			STATE S_9	
18	A3J6 - V		P17 - 10		BLACK			STATE S_{10}	
19	A3J6 - W		P32 - 11		BROWN			+5VDC OUT	
20	A3J6 - X		-					SPARE	
21	A3J6 - Y		P17 - 11		BROWN			STATE S_{11}	
22	A3J6 - Z		P17 - 12		ORANGE			STATE S_{12}	

ESC-125C WIRE LIST CONNECTOR A3J6 PROJECT (ACCESSORY) TO INTERCONNECTION BOARD A2A7 - J17 & J32	SHEET 1 OF 3	DWG NO.	REV

LINE	FROM A3J6	SYMBOL	TO A2A7-J17 & J32	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	A3J6 - AA		-					SPARE	
2	A3J6 - BB		-					SPARE	
3	A3J6 - CC		P17 - 13		ORANGE			STATE 13	
4	A3J6 - DD		P32 - 1		BROWN			STATE 14	
5	A3J6 - EE		-					SPARE	
6	A3J6 - FF		-					SPARE	
7	A3J6 - HH		P32 - 2		RED			STATE 15	
8	A3J6 - JJ		P32 - 3		ORANGE			GND	
9	A3J6 - KK		-					SPARE	
10	A3J6 - LL		-					SPARE	
11	A3J6 - MM		P32 - 4		YELLOW			SHIELD GND	
12	A3J6 - NN		-					SPARE	
13									
14	A2A7 - J17		A3J6						
15	P17 - 1		A3J6 - A		BROWN			REPEAT	
16	P17 - 2		A3J6 - B		RED			REPEAT	
17	P17 - 3		A3J6 - E		ORANGE			REPEAT	
18	P17 - 4		A3J6 - F		YELLOW			REPEAT	
19	P17 - 5		A3J6 - K		GREEN			REPEAT	
20	P17 - 6		A3J6 - L		BLUE			REPEAT	
21	P17 - 7		A3J6 - P		VIOLET			REPEAT	
22	P17 - 8		A3J6 - R		GRAY			REPEAT	

PROJECT		SHEET		DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J6 (ACCESSORY) TO INTERCONNECTION BOARD A2A7-J17 & J32		2 OF 3			

LINE	FROM A2A7 - J17	SYMBOL	TO A3J6	R/E	WIRE COLOR	WIRE AWG	ROUTE	REMARKS	CHECK LIST
1	P17 - 9		A3J6 - U		WHITE			REPEAT	
2	P17 - 10		A3J6 - V		BLACK			REPEAT	
3	P17 - 11		A3J6 - Y		BROWN			REPEAT	
4	P17 - 12		A3J6 - Z		RED			REPEAT	
5	P17 - 13		A3J6 - CC		ORANGE			REPEAT	
6									
7	A2A7 - J32		A3J6						
8	P32 - 1		A3J6 - DD		BROWN			REPEAT	
9	P32 - 2		A3J6 - HH		RED			REPEAT	
10	P32 - 3		A3J6 - JJ		ORANGE			REPEAT	
11	P32 - 4		A3J6 - MM		YELLOW			REPEAT	
12	P32 - 5		A3J6 - C		GREEN			REPEAT	
13	P32 - 6		A3J6 - D		BLUE			REPEAT	
14	P32 - 7		A3J6 - H		VIOLET			REPEAT	
15	P32 - 8		A3J6 - J		GRAY			REPEAT	
16	P32 - 9		A3J6 - M		WHITE			REPEAT	
17	P32 - 10		A3J6 - N		BLACK			REPEAT	
18	P32 - 11		A3J6 - W		BROWN			REPEAT	
19	P32 - 12		A3J6 - S		RED			REPEAT	
20	P32 - 13		A3J6 - T		ORANGE			REPEAT	
21									
22									

PROJECT	SHEET	DWG NO.	REV
ESC-125C WIRE LIST CONNECTOR A3J6 (ACCESSORY) TO INTERCONNECTION BOARD A2A7 - J17 & J32	3 OF 3		

Section VII

Reference Data

7.1 General

This section contains schematic diagrams for the ESC-125C Programmer and the SU-125 Switching Unit.

LIST OF DIAGRAMS

Figure 7-1	CABLING DIAGRAM ESC-125C
Figure 7-2	CONTROL PANEL BOARD A1A1
Figure 7-3	LOGIC BOARD A2A2
Figure 7-4	SWEEP BOARD A2A3
Figure 7-5	DISPLAY BOARD A2A4
Figure 7-6	PLOTTER OFFSET BOARD A2A5
Figure 7-7	SIGNAL SELECT BOARD
Figure 7-8	ESC-125C POWER DISTRIBUTION
Figure 7-9	SU-125 SWITCHING UNIT

Section V

Accessory Data

5.1 General

This section contains a list (Table 5-1) and information about the accessories that are designed for operation with the ESC-125C Programmer.

5.2 Input Signal Switching Unit (SU-125)

The input signal switching unit routes the incoming signal to the analyzer selected by the programmer. Various signal connections are accomplished by connecting patch cords between jacks on a patch board in the switching unit. Figure 5.1 shows the signal input-output connectors on the switching unit. Figure 5.2 shows switching relays and the patch board.

Relay K8, K7, K10 or K9 routes the selected signal from J81, J82, J83, or J84 through J85, out to one of the analyzers. Relay K2, K1, K4, K3, K6 or K5 routes the selected signal from J74, J75, J76, J77, J78 or J79 through J80, out to the other analyzer. Switching information and power for remote antennas are delivered through J1 and J2.

Input signal connector selection is controlled by the SIGNAL SELECT A2A6 board in the programmer. This information is fed to the patch board. By means of patching, the operator may select any of the 10 relays to be actuated for any particular state of the programmer, thus selecting the connector required. Figure 5.3 shows the location of each connector on the patch board. Connector J3 will be active when the programmer has selected the frequency

band assigned to the EMC-10 analyzer (band 0). Connectors J4 through J18 are associated with the EMC-25 analyzer. Table 5-2 lists the frequency bands associated with the patch board connectors.

Relay power and connector selection information are delivered to the switching unit from the programmer through connector P1.

Table 5-3 shows the relationship between the components shown in Figures 5.1, 5.2 and 5.3. By means of patching between the patch board connectors listed in Table 5-2 and the patch board connectors listed in Table 5-3, various signal input connectors may be selected for each output connector. For example, by patching J9 to J24, and J10 to J25, signal input connector J76 will be selected when bands 6 or 7 are being scanned.

The switching unit will be programmed by the operator with the patch cords, in order to obtain the desired input/output combinations. In normal use, this arrangement will be unchanged, once it has been selected.

Input signal connectors J74 and J81 are used for calibrating the interference analyzers. Relays K2 and K8 are activated when the ESC-125C RF INPUT switch is placed to the CAL position.

The antennas and pickup devices used by the EMC-25 are connected to connectors J75-J79, the antenna used by the EMC-10 is connected to connector J82.

A CIG-25 IMPULSE GENERATOR is connected to J74, while J80 is connected to the RF INPUT connector of the EMC-25. When the ESC-125C RF INPUT switch is palced in ghe CAL position, the output of the

CIG-25 is connected to the RF INPUT of the EMC-25. This permits the EMC-25 to be calibrated. In the NORMAL position of the ESC-125C RF INPUT switch the RF signals from the various antennas and pick up devices are routed to the RF INPUT of the EMC-25.

The EMC-10 OUTPUT connector is connected to J83, while J85 is connected to the INPUT connector of the EMC-10. When the ESC-125C RF INPUT switch is placed in the CAL position and the EMC-10 OUTPUT FUNCTION SELECTOR switch is placed to the CAL-TRACKING position, the CAL output of the EMC-10 is connected back to the INPUT connector of the EMC-10. This allows the EMC-10 to be calibrated. In the NORMAL position of the ESC-125C RF INPUT switch, the signal input from the antennas is routed to the INPUT connector of the EMC-10.

TABLE 5-1

ACCESSORY LIST

1) Input Signal Switching Unit (SU-125)

2) Cables

   a) EMC-10 (4656-1)

   b) EMC-25 (4657-1)

   c) Input Signal Switching Unit (4660-1)

   d) Power Cord (PCD-25)

   e) Coax Cable (CAC-25) (2)

   f) Coax Cable (CAB-10)

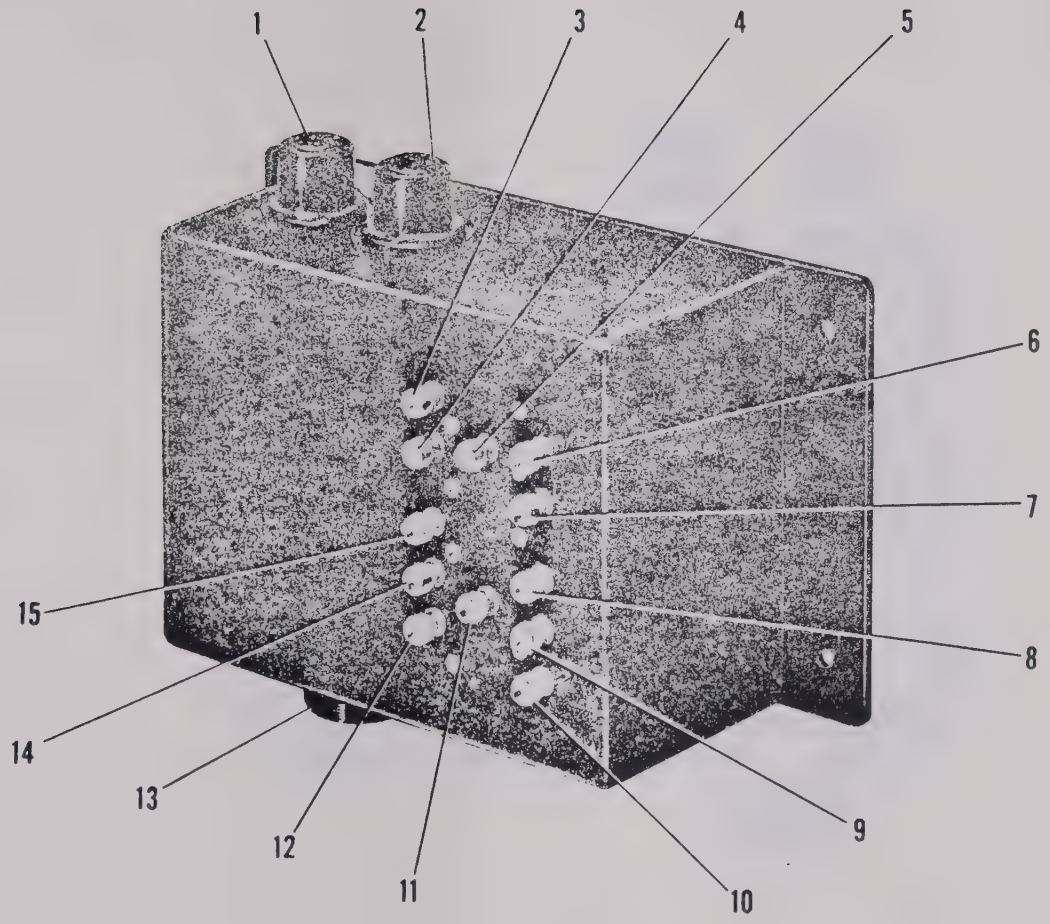
3) Adapter Brackets for 19-inch mounting (ABA-125)

4) Patch Cords (18) (1471-3-03-10)

TABLE 5-2

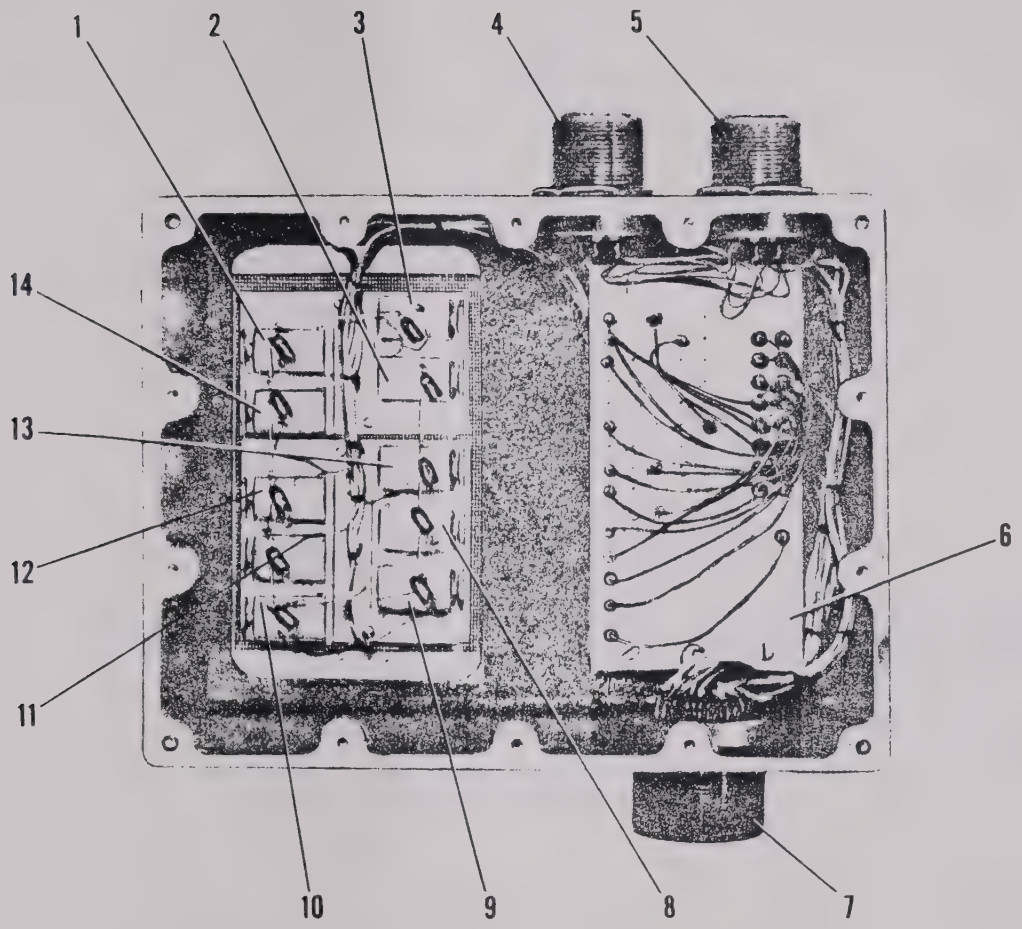
INPUT SIGNAL SELECTION

Frequency Band	Patch Board Connector
EMC-10 Band	J3
EMC-25 — Band 1	J4
Band 2	J5
Band 3	J6
Band 4	J7
Band 5	J8
Band 6	J9
Band 7	J10
Band 8	J11
Band 9	J12
Band 10	J13
Band 11	J14
Band 12	J15
Band 13	J16
Band 14	J17
Band 15	J18



1. Remote Antenna Control Connector, J1
2. Remote Antenna Control Connector, J2
3. Signal Input Connector, J84
4. Signal Input Connector, J82
5. Signal Output Connector, J85
6. Signal Input Connector, J83
7. Signal Input Connector, J81
8. Signal Input Connector, J78
9. Signal Input Connector, J76
10. Signal Input Connector, J74
11. Signal Output Connector, J80
12. Signal Input Connector, J75
13. Switching and Power Connector, P1
14. Signal Input Connector, J77
15. Signal Input Connector, J79

Figure 5.1 Signal Input-Output Connectors



1. Coaxial Relay, K10
2. Coaxial Relay, K7
3. Coaxial Relay, K9
4. Remote Antenna Control Connector, J2
5. Remote Antenna Control Connector, J1
6. Patch Board
7. Switch and Power Connector, P1
8. Coaxial Relay, K3
9. Coaxial Relay, K1
10. Coaxial Relay, K2
11. Coaxial Relay, K4
12. Coaxial Relay, K6
13. Coaxial Relay, K5
14. Coaxial Relay, K8

Figure 5.2 Signal Switching Unit - Component Location

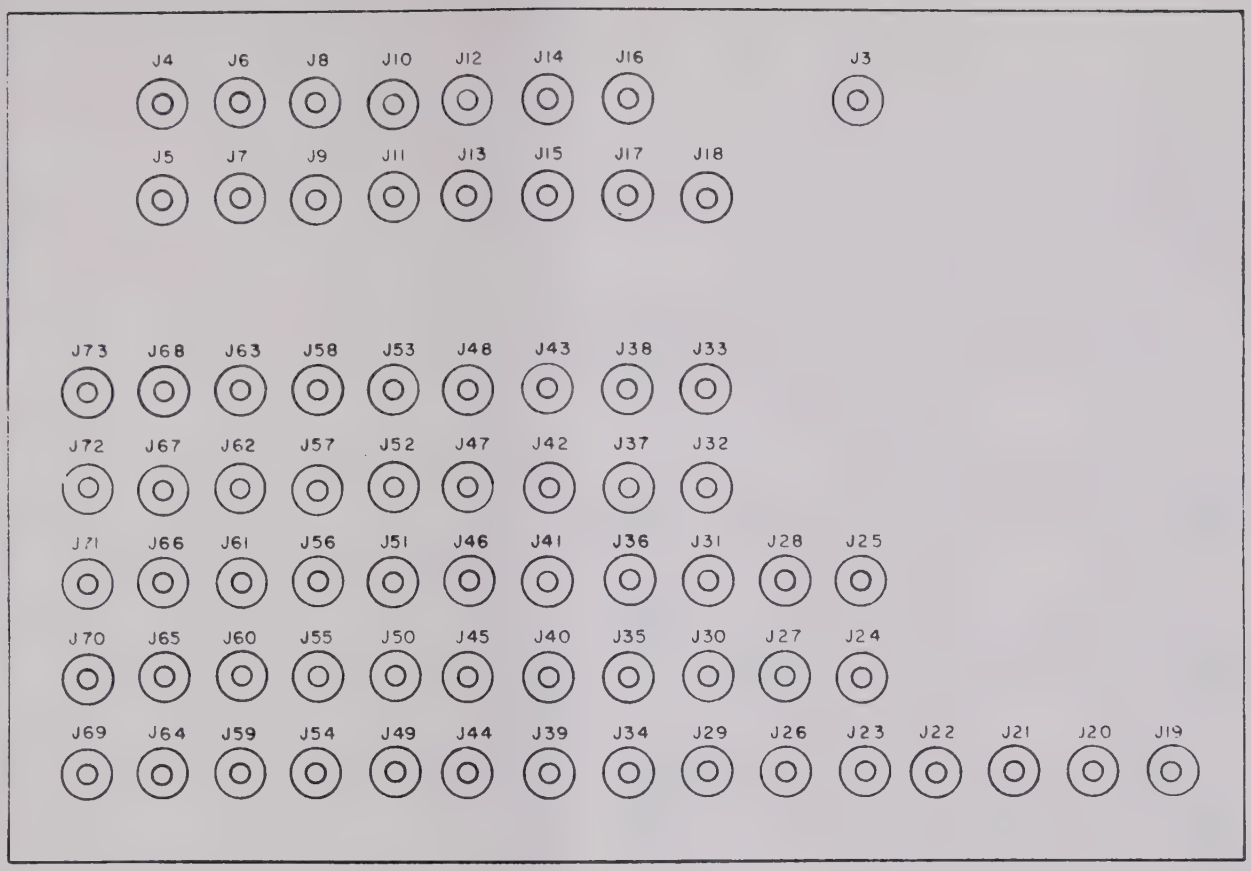


Figure 5.3 Patch Board Connections

TABLE 5-3

INPUT/OUTPUT CONNECTOR SELECTION

	Signal Input Connector	Signal Output Connector	Associated Coaxial Relay	Patch Board Connector
Group 1	J74	J80	K2	CAL Command
	J75	J80	K1	J19-J22
	J76	J80	K4	J23-J28
	J77	J80	K3	J29-J33
	J78	J80	K6	J34-J43
	J79	J80	K5	J44-J58
Group 2	J81	J85	K8	CAL Command
	J82	J85	K7	J59-J63
	J83	J85	K10	J64-J68
	J84	J85	K9	J69-J73

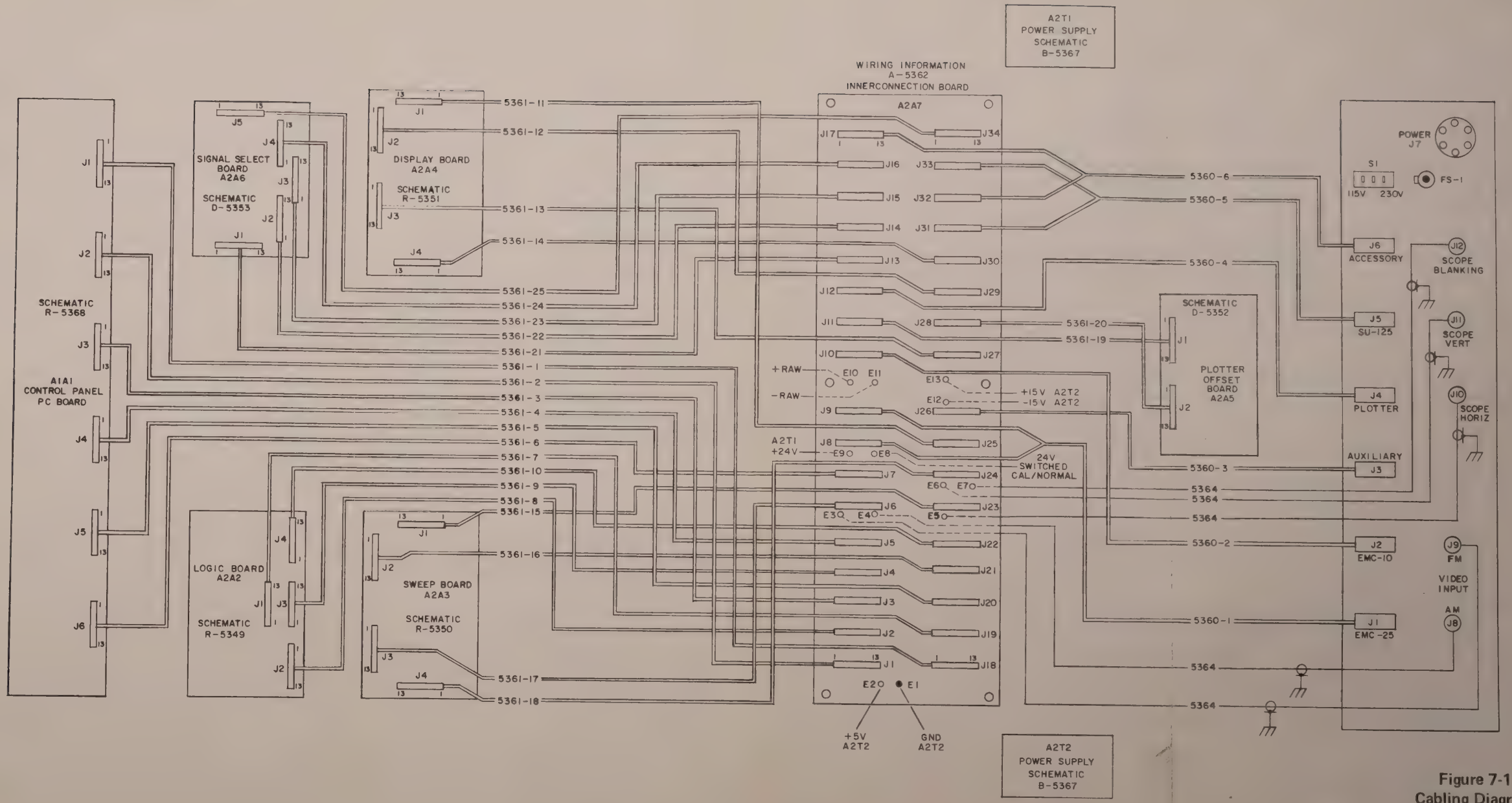
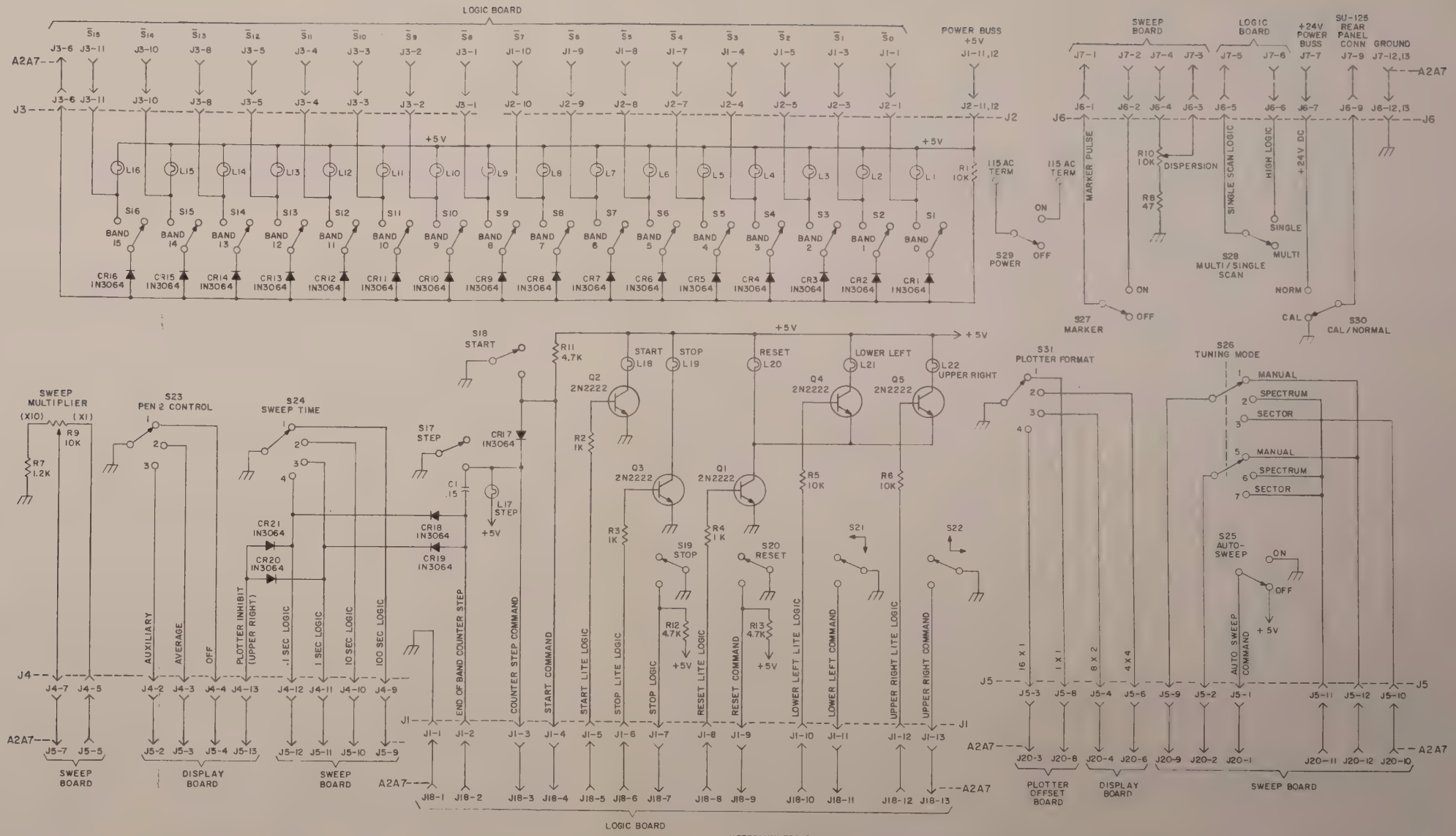
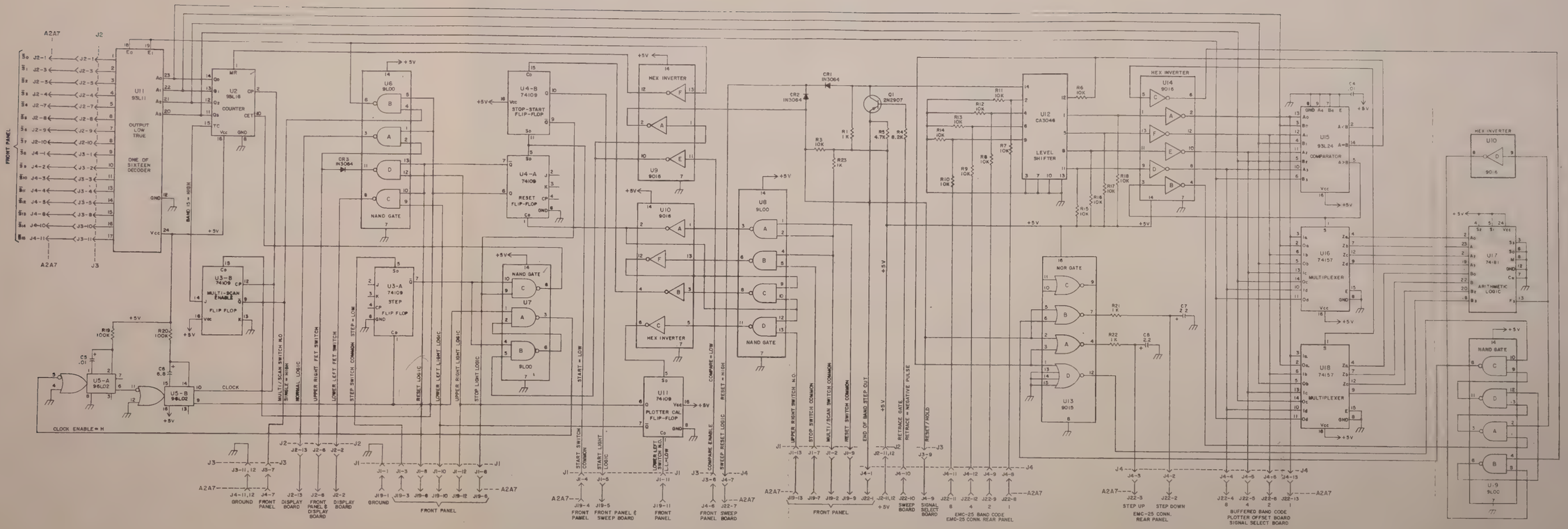


Figure 7-1
Cabling Diagram
(ESC-125C)



NOTES: UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTOR VALUES ARE IN OHMS ±10% 1/4W.
2. ALL CAPACITOR VALUES ARE IN MICROFARADS ±10%.
3. ALL BAND SELECT SWITCHES, S1 THRU S16, ARE SHOWN UNSELECTED.
4. ALL COMPONENTS MARKED WITH AN ASTERISK (*) ARE FACTORY ADJUST.

Figure 7-2
Control Panel P.C. Board
(A1A1)



NOTES: UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTOR VALUES ARE IN OHMS ± 10%, 1/4 W.
2. ALL CAPACITOR VALUES ARE IN MICROFARADS ± 10%.
3. ALL COMPONENTS MARKED WITH AN ASTERISK (*) ARE FACTORY ADJUST.

Figure 7-3
Logic Control Board
(A2A2)

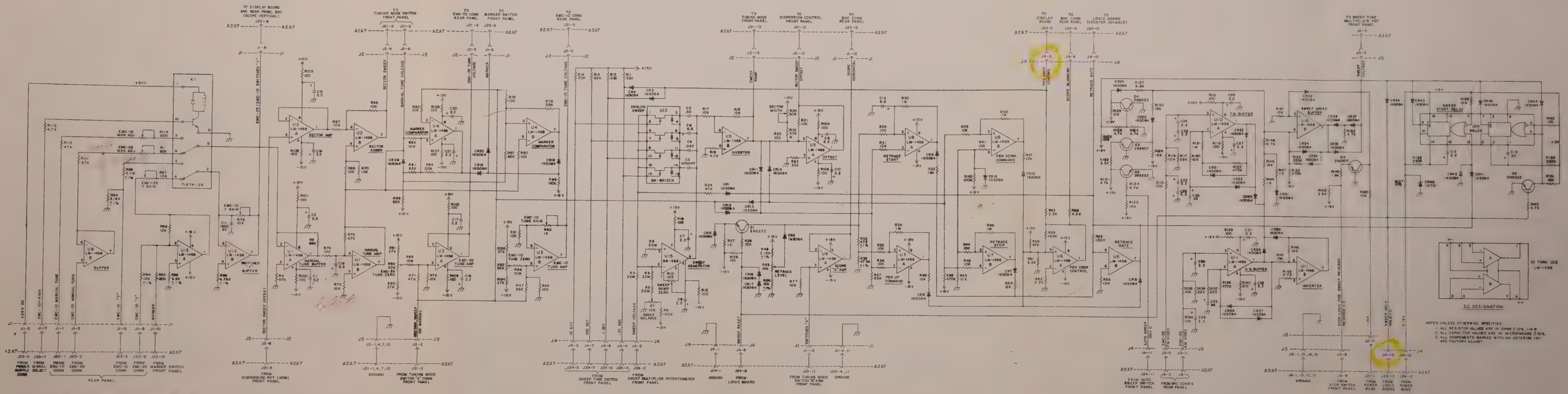


Figure 7-4
Sweep P.C. Board
(A2A3)

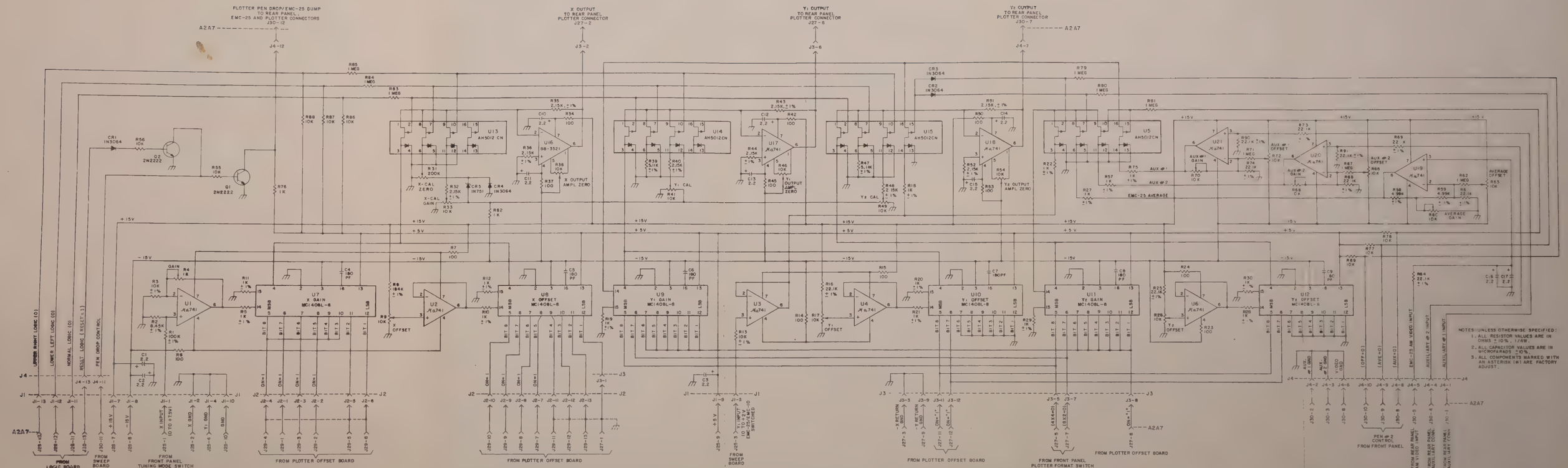


Figure 7-5
Display P.C. Board
(A2A4)

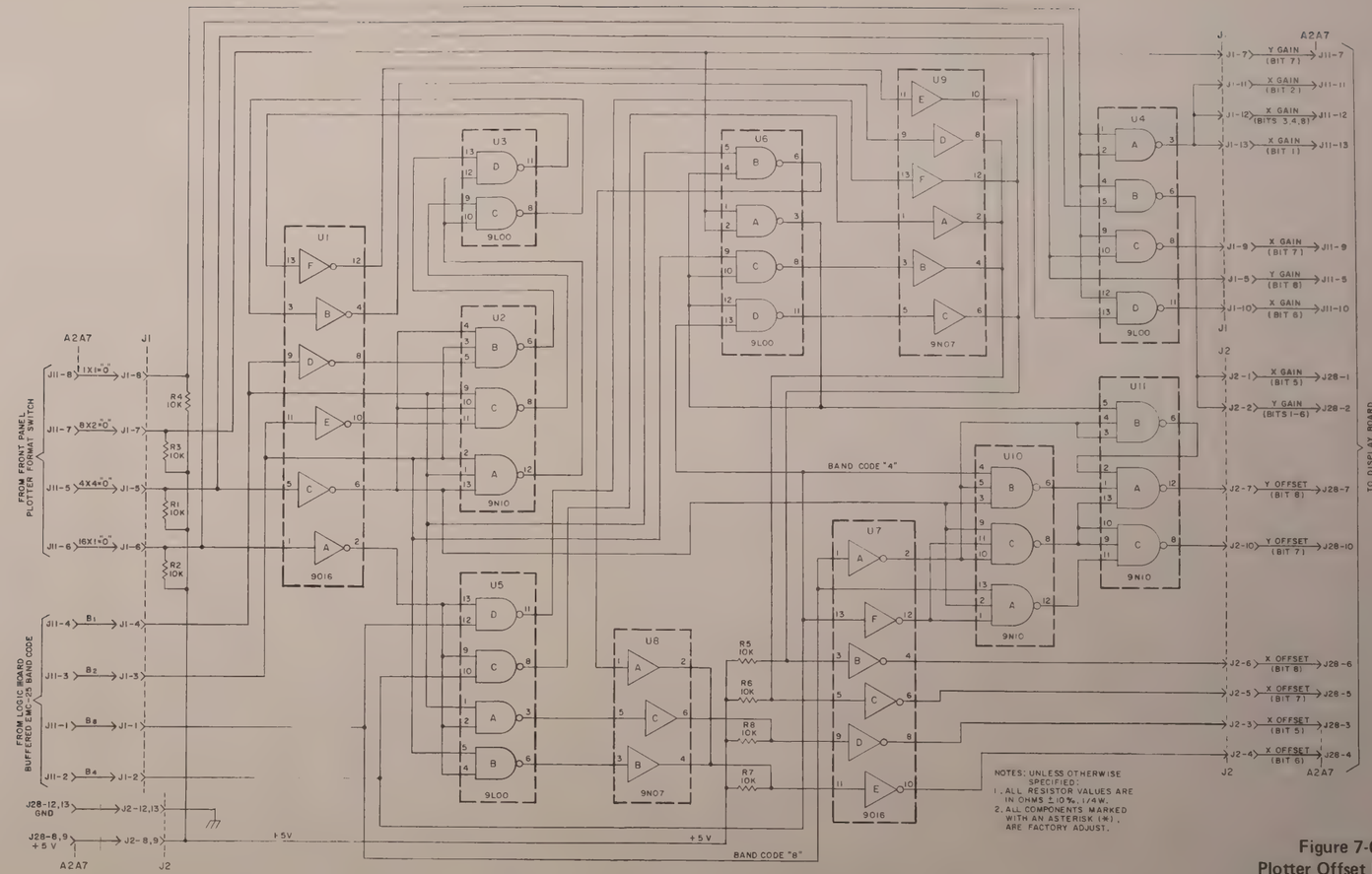


Figure 7-6
Plotter Offset Board
(A2A5)

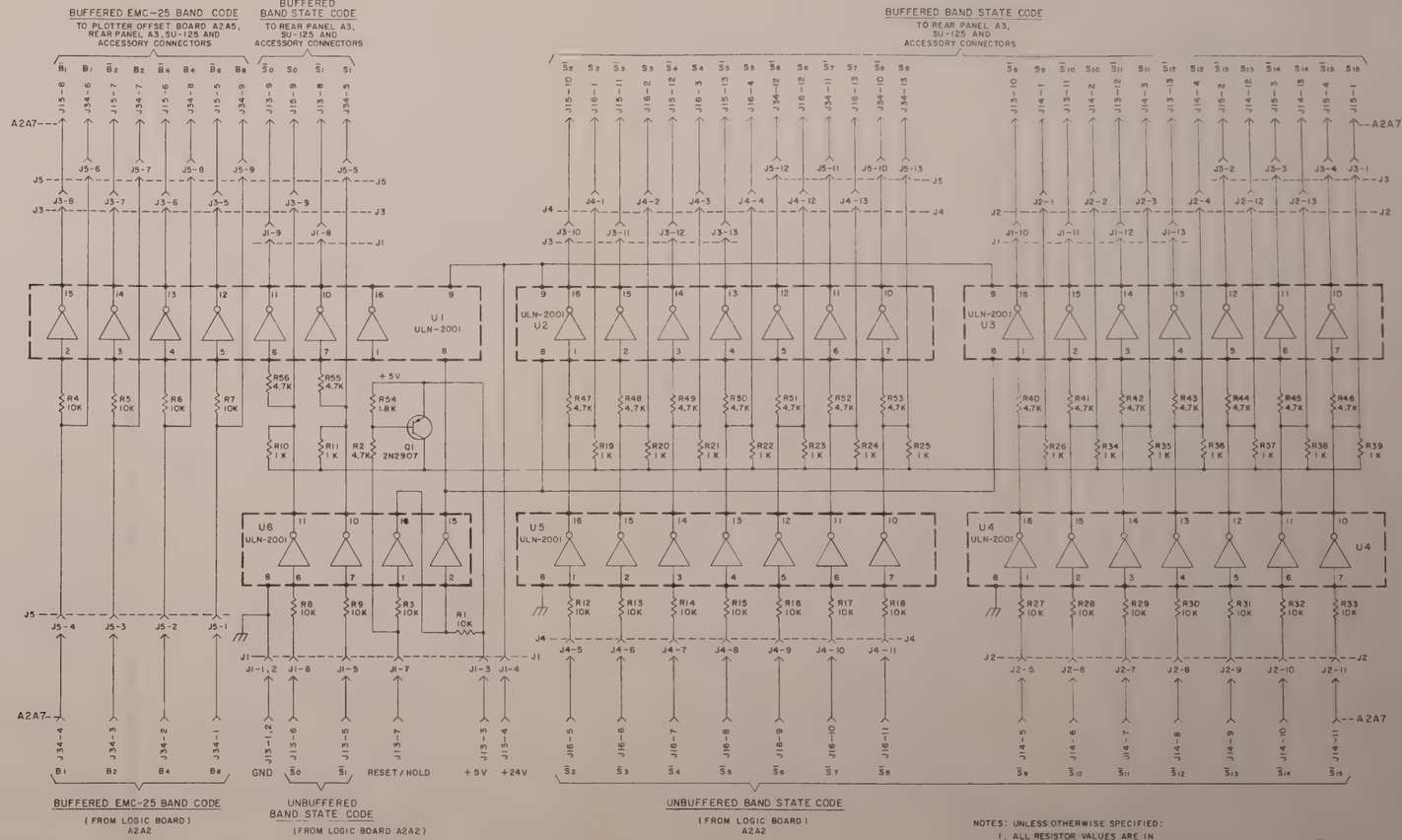


Figure 7-7
Signal Select P.C. Board
(A2A6)

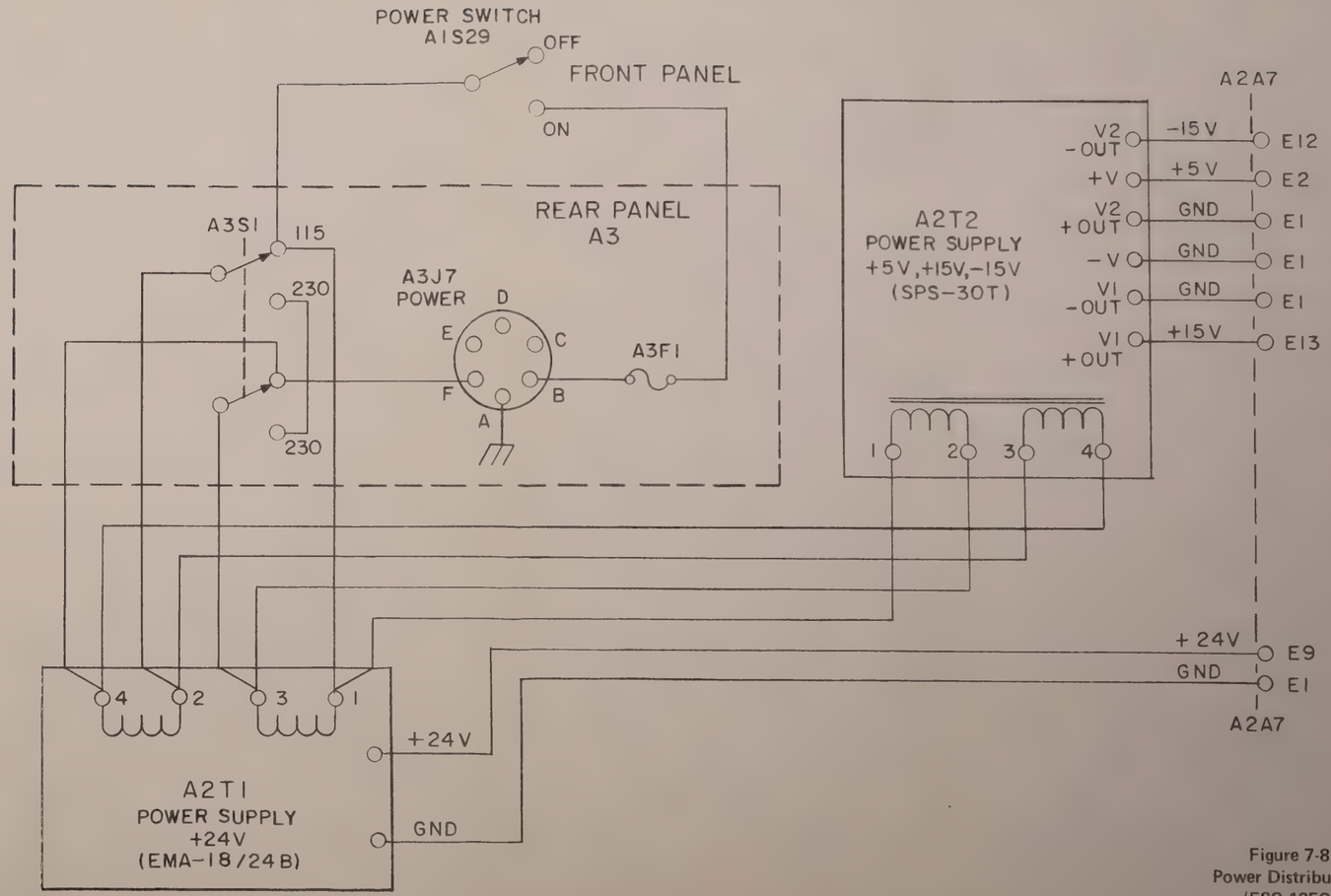


Figure 7-8
Power Distribution
(ESC-125C)

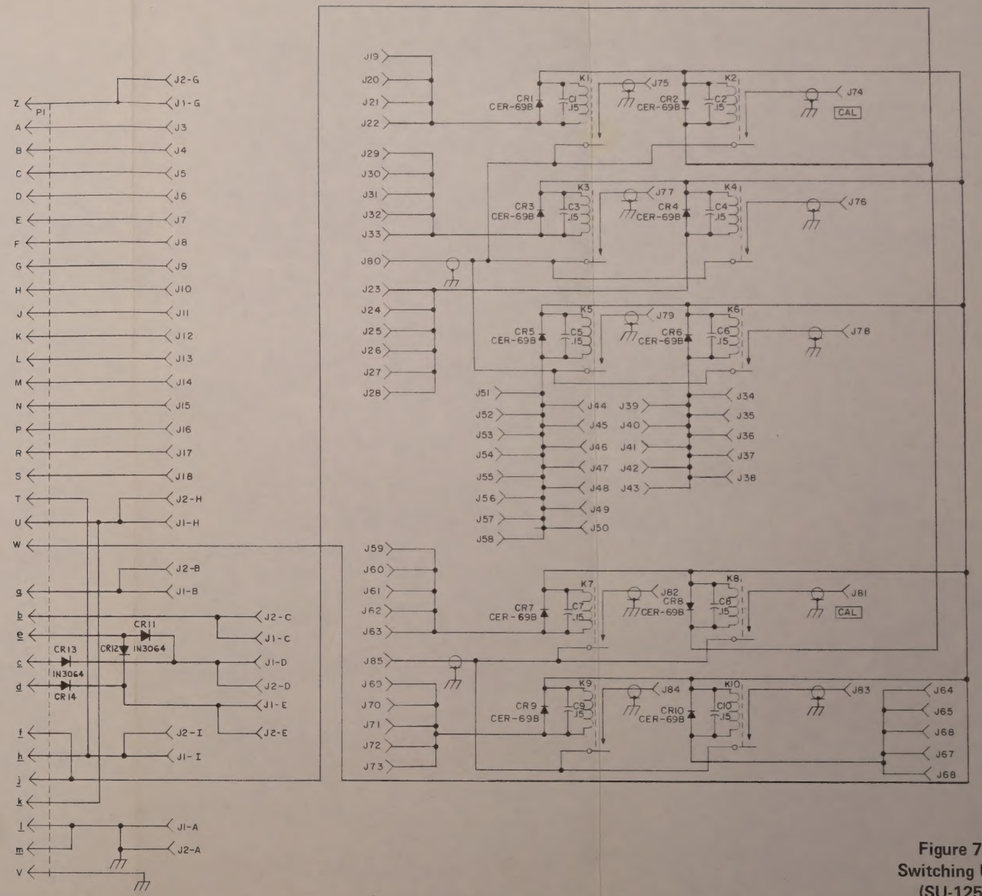


Figure 7-9
Switching Unit
(SU-125)

MP MASTER
MA31887